Paradoxical performance: Predictors and mechanisms associated with the yips and choking

UNIVERSITY OF DERBY

PARADOXICAL PERFORMANCE: PREDICTORS AND MECHANISMS ASSOCIATED WITH THE YIPS AND CHOKING

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List of Abbreviations

ACT	Attentional Control Theory
PET	Processing Efficiency Theory
EMH	Explicit-Monitoring Hypothesis
CPH	Conscious Processing Hypothesis
FNE	Fear of Negative Evaluation
OCD	Obsessive Compulsive Disorder
ORG	Organisation
COM	Concern over Mistakes
EMG	Electromyography
MRI	Magnetic Resonance Imaging
EEG	Electroencephalogram
EFT	Emotional Freedom Technique
PE	Physical Examination
HR	Heart Rate
NCV	Nerve Conduction Velocity
FTT	Finger Tapping Test
SFGI	Solution Focussed Guided Imagery
LMS	Lost Movement Syndrome
EMDR	Eye Movement Desensitisation and Reprocessing
IV	Independent Variable
DV	Dependant Variable
CPM	Choking Predictive Model
YPM	Yips Predictive Model
PMD	Psychogenic Movement Disorders
SPL	Stroke Path Length
CHV	Club head Velocity
AABC	Attack Angle at Ball Contact
LOD	Length of Draw
DT	Draw Time
WA	Wrist Angle
SAB	Shoulder Abductor
SAN	Shoulder Angle
PS	Perfectionistic Striving
PC	Perfectionistic Concerns
HP	High Pressure
PSP	Perfectionistic Self-Promotion
NDISP	Non-Display of Imperfection
NDISC	Non-Disclosure of Imperfection

<u>Measures</u>

CSAI-2R	Competitive State Anxiety Inventory 2- Revised
CSAI	Competitive State Anxiety Inventory
OCS	Obsessive Compulsive Scale
LOI	Leyton Obsessional Inventory
EPI	Eysenck Personality Inventory
BTBS	Bortner Type A Behaviour Scale
SRDS	Self-Rating Depression Scale
FMPS	Frosts Multidimensional Perfectionism Scale
BFNE-II	Brief Fear of Negative Evaluation- II
SDMT	Symbol Digit Modalities Test

ASI-III	Anxiety Sensitivity Index- III
PSPS	Perfectionistic Self-Presentation Scale
SCS	Self Conscious Scale
BFI-10	Big Five Inventory-10
PCOSES	Perceived Control over Stressful Events Scale
SMPS-2	Sport Multidimensional Perfectionism Scale-2
RSME	Rating Scale of Mental Effort

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Preface

This thesis submitted for the degree of Doctor of Philosophy entitled “Paradoxical performance: predictors and mechanisms associated with the yips and choking” is based on work conducted by the author at the University of Derby between the years 2012 and 2016. All the work recorded in this thesis is original unless otherwise acknowledge in the test or by references. If necessary, for the deposit of this thesis in the institutional repository, permission to disseminate third party material has been sought and granted by copyright holders. None of the work has been submitted for another degree in this or any other University.

Dissemination

The contents of this thesis have been published in the *International Review of Sport and Exercise Psychology*, presented at various conferences both nationally and internationally.

Publications

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Abstract

In sport, the ability to perform under heightened levels of pressure is one of the largest differences between those who are successful and those who are not. There are a number of phenomena associated with breakdowns in an athlete's performance in high pressure environments, collectively known as paradoxical performances (Baumeister & Showers, 1986). The two most prevalent and researched forms of paradoxical performance are the yips and choking. Although choking has been identified as playing a key role in understanding the yips, to date, no literature has explored these phenomena simultaneously. The current literature highlights potential mechanisms which may explain the yips and choking, such as the Attentional Control Theory (Eysenck & Derekshan, 2011) and the Conscious Processing Hypothesis (Masters, 1992). However, there is limited literature on the potential predictors that may increase the susceptibility of both these paradoxical performances and those which do, focus on golf.

There are three aims of this thesis. The first aim was to develop a definition that best encompasses all aspects of the yips. This was achieved by conducting a systematic review of the yips literature which supported the development of a new two dimensional yips model including individuals with both focal dystonia and choking (type-III). The second aim was to investigate potential predictors associated with both the yips and choking that was achieved by completing two studies. The first explored the lived experiences of elite level archers who have experienced both choking and the yips and revealed a number of potential predictors associated with both the yips and choking. The second study tested these predictors using online questionnaires with elite level archers and golfers, and confirmed two discrete predictive models for yips and choking. The final aim of the thesis was to investigate the potential mechanisms associated with performance under pressure. A lab-based study where golfers and archers performed under both high and low pressure found that pressure elicited a range of psychological, physiological and kinematic changes in performance.

The proposed two dimensional model from the systematic review received initial support for its application. A number of participants met the criteria for each of the different classifications: type-I, those who experience focal dystonia like symptoms; type-II, those who experience choking like symptoms and; type-III, those who experience both focal dystonia and choking like symptoms. This thesis also highlights the role of social predictors of the yips and choking with perfectionistic self-presentation being the most influential for those susceptible for the yips. These findings will enable practitioners to have a better understanding to effectively classify those who experience choking and the yips. This will allow practitioners to more effectively intervene with those who experience different

classifications of the yips. The thesis also highlights the issues in the current literature that surround the measurement and conceptualisation of the yips type-I, type-II and type-III behaviour and provides future directions.

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As I sit here trying to write this acknowledgments section, I can't help but think of the journey I have been through over the years and how many people have helped me to get to this point where I am able to write this section. This PhD process has been the most challenging thing I have ever experienced, not only from an academic perspective but also from a personal perspective, which I have managed to get through thanks to the invaluable support of some key people who I wish to thank, that warrant special mention.

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Dedication

To my mammy, we did it! I don't think I will be able to truly put down on paper how proud I am to have you as my mother. You and dad raised me so well, and gave me all the tools needed to succeed in this world. Watching you battle cancer, was one of the most inspirational things I ever witnessed, although you lost that fight, you showed me that no matter how tough times get, you need to approach it with a smile and a positive attitude and never give up. You showed me that it was not the size of the dog in the fight but the size of the fight in the dog. Losing you so early into starting this PhD, was something that nearly broke me mentally, I came close to giving up as I thought I would not be able to finish it. But it was the thought of you that kept me going, as I needed to finish this journey, to make you proud, and fulfil that promise I made! We will get to graduation and although you won't be there physically, you will be there in spirit, we will finally get to wear that "floppy hat", and do so knowing that this was all for you. We shall celebrate with your famous green tea in hand. I dedicate this thesis to you as it symbolises all the skills you and dad have instilled in me!

R.I.P. SANDRA CLARKE 1961-2013

Chapter 1: Introduction and Literature Review

1.1 Introduction

In modern sport, the difference between success and failure depends on an individual's ability to successfully execute motor skills under heightened levels of pressure. Research over the last three decades has investigated performance under pressure and various phenomena associated with why athletes struggle to perform when it matters most (Hill, Hanton, Matthews, & Fleming, 2010a; Lobinger, Klampfl, & Altenmuller, 2014; Masters, 1992; Smith et al. 2000). These phenomena have been identified as paradoxical performances, whereby *"the occurrence of inferior performance despite striving and incentives for superior performance"* (Baumeister & Showers, 1986; p.288). The aim of this thesis will be to investigate the key predictors and mechanisms associated with two of the most popular paradoxical performances; the yips and choking. This introduction discusses these phenomena, starting with the yips, and details their definitions, prevalence rates and the implications of each.

Once an athlete develops a skill, it becomes an automatic, consistent routine that requires minimal working memory resources to execute (Schneider, Duamais, & Shiffrin, 1984). The yips are a disorder which disrupts the execution of these once automatic fine motor skills (Bawden & Maynard, 2001). Although research has begun to explore this phenomena, a majority of the evidence is anecdotal, primarily from elite level athletes, whose success in sport requires predominately fine motor skill execution such as golf (BBC Sport, 2010; White, 1993). As such, the media have helped to disseminate and popularise the term "the yips". For example, two-time major golf champion Bernard Langer experienced long term problems in executing automatic skills associated with his short game, which was especially apparent during his putting. Langer stated *"I was 18 years old when I won my first tournament on the European Tour. That's where I first developed "the yips". This is a jerky, uncontrolled putting stroke that send scores soaring. All of my career I've struggled to control the yips. At one point I was yipping so badly that I four-putted from three feet and actually hit the ball twice. Those were extremely difficult times. I often thought about quitting"* (White, 1993, p.13). As seen in the quote, Langer experienced involuntary twitches and flinching during these movements.

Athletes from other sports, such as former England international cricketer Keith Medlycott retired at the age of 26 due to experiencing the yips symptoms that dramatically deteriorated his bowling performance (BBC Sport, 2002). Gavin Hamilton, a cricketer, also stated that his yips symptoms impacted his ability to bowl as he perceived *"the stumps looked 60 yards away"* (BBC Sport, 2002). Moreover, in 2010 seven-time World Snooker Champion Stephen Hendry suffered with the yips for the last ten years of his career stating *"On some shots I don't even get the cue through…it's so frustrating it's like giving these guys a 50-point head start it's horrendous"* (BBC Sport, 2010). Hendry retired two years later, after suffering a heavy defeat at the world championships quarter-final, later explaining that *"the fact I'm not playing the snooker I want to play, and the fact I'm not enjoying practise"* (BBC Sport, 2012) was the reason behind his decision. One final example is five-time World Darts Champion Eric Bristow, who suffered an involuntary disorder whereby he could not release the dart stating *"I brought the dart back, got halfway through throwing it and could not let it go, I don't know how I got it or how I got rid of it but I had it for 10 years"* (Honeyball, 2004). It is clear, therefore, that across these sports the athletes experience similar psychological and physical symptoms during the aiming and release phase of their movement, with the main difference being the sport-specific limb impacted.

Hank Haney (2006) describes the yips as golf's worst curse. Indeed, with the number of high profile athletes experiencing this disorder, and the detrimental impact it can have on performance, it is unsurprising that the literature regarding this topic is growing. In extreme cases, the yips have contributed to the attrition from sport, as described by Keith Medlycott and Stephen Hendry. Interestingly, these types of symptoms have also been associated with non-sporting tasks that require individuals to consistently repeat fine motor skill movements such as those experienced by writers, musicians and surgeons (Jinnah et al., 2013; Smith et al., 2003). For instance, musicians who experience musician's dystonia, reported an involuntary extension or flexion of one or two of the fingers prominent for performance (Jinnah et al., 2013). This is similar to the sporting examples above, due to their comparable physical symptoms (involuntary movement) that are exhibited when they perform under pressure situations.

To date, only golf research has been able to provide prevalence rates, ranging from 16% to 54% (McDaniels, Cummings, & Shain, 1989; Sachdev, 1992; Smith et al., 2000). When compared to other professions or groups who experience similar symptoms, such as musician's dystonia, this is notably higher. For example, Altenmüller (2003) reported that 1% of musicians experienced musician's dystonia, and less than .05% of the general population experience general movement disorders (Nakashima, Kusumi, Inoue, & Takahashi, 1995; Nutt, Muenter, Melton, Aronson, & Kurland, 1988). These higher prevalence rates within golf emphasise the importance of understanding the aetiology and mechanisms associated with the yips in golfers and other athletes.

The majority of research in the yips to date has focused on golf (McDaniels et al., 1989; Philippen & Lobinger, 2012; Sachdev, 1992; Smith et al., 2000, 2003; Stinear et al., 2006), revealing that golfers who display yips symptoms are young in age (e.g., *M* age = 35.1; Sachdev, 1992) but experienced (e.g., *M* years= 20.9; McDaniel et al., 1989). The yips have been shown to decrease performance in golf (Adler et al., 2011) by negatively impacting golfers' handicap. For instance, Adler et al. (2011) reported that yips-affected golfers had a significantly higher "best handicap" than those unaffected, suggesting the yips symptoms dramatically increased their handicap. This is supported by Sachdev's (1992) report that the yips added approximately 4.7 strokes to the overall score over 18 holes. Research has indicated this may be due to the negative impact the yips has on the short game in particular, for example chipping and putting, predominantly when putting within 1.5 metres (five feet) of the hole (McDaniel et al., 1989; Philippen & Lobinger, 2012; Smith et al., 2000, 2003; Stinear et al., 2006). Although less frequent, golfers have reported experiencing symptoms in other areas of the game such as driving and long chipping (Anhenbach, 2004; as cited in Bell & Thompson, 2007). This further supports the negative impact that the yips can have on overall performance within golf. There is no equivalent data on the yips in any other sport, to the author's knowledge, to allow for comparison, consequently future research on performance diminution is warranted.

There have been many different definitions which aim to encapsulate the yips. It was first described as an occupational cramp by Foster in 1977. Later, McDaniel et al. (1989) defined the yips as an involuntary movement experienced during the execution of a skill that has a detrimental impact on golfing performance, thus emphasising the physical implications of the disorder. Pelz (1989) reported that professional golf teachers defined the yips as a "fail safe shutdown" that surfaced due to the decline of confidence, stemming from unsound stroke mechanics, emphasising the impact of both psychological and physical factors. These range in definitions, lead to Smith et al. (2000) incorporating both psychological and physiological aspects in their definition of the yips as a *"psycho-neuromuscular impediment affecting the execution of the putting stroke"* (p.424). Despite the variation in the definitions, they all contain both psychological and physiological components; however, it is worth noting these definitions concern golf specifically.

Some literature has indicated that the yips may be a more severe or chronic form of choking (Masters, 1992; Klampfl, Lobinger, & Raab, 2013a) while other reviews indicate that the yips and choking are completely different forms of performance breakdown (Hill et al., 2010a). Choking is an extreme outcome of the anxiety and performance relationship (Baumeister, 1984) and has been suggested as the best explanation for the psychological components of the yips (Bawden & Maynard, 2001; Masters, 1992). This is supported by qualitative accounts of yips, where athletes exhibit similar characteristics to a severe form of choking, for example, heightened self-consciousness (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2012). Therefore, in order to gain a comprehensive understanding of the yips, it is imperative to explore the role of choking and the yips simultaneously. This will allow for a clearer understanding of the differences and similarities between the psychological factor associated with the yips and choking.

To date, research has not detailed the prevalence rates for the likelihood of experiencing a choke. There is a need, therefore to investigate choking as the second paradoxical performance and the prevalence rates of this phenomena. Interest in choking research has increased in recent years (Hill et al., 2010a; Mesagno, Harvey, & Janelle, 2012; Mesagno, Marchant, & Morris, 2009; Mesagno & Mullane-Grant, 2010). The most recent definition of choking suggests that *"choking in sport is a process whereby the individual perceives that their resources are insufficient to meet the demands of the situation, and concludes with a significant drop in performance- a choke"* (Hill et al., 2009, p.206). Beilock and Gray (2007), however, identified that if sub-optimal performance is to be considered a choke, it is imperative that the individual is motivated towards achieving the goal and regards the situation as being very important. Therefore, it is the athlete's negative specific psychological response to pressure and not the changeability of the athlete's skill level which indicates a choke.

A review of the choking literature by Hill et al. (2010a) revealed that one of the major inconsistencies within the literature was how a choke was classified as having occurred or not. For instance, Lewis and Linder (1997) identified that a choke occurred only if a deterioration of more than 2.6cm occurred during a golf putting task. Interestingly in a similar golf putting task, Guiciardi and Dimmock (2008) also incorporated absolute error score using total distance from the hole (3ms) to aid in classifying a choke. In contrast, Vickers and Williams (2007) used a percentage in deterioration of shooting scores from low to high-pressure situations for elite biathletes. If the participants experienced a deterioration in performance greater than 40%, it was classified as a choke, and they further attributed choking with changes in visual attention. Thus, a more consistent approach of classifying a choke is needed to allow for a more systematic and objective measurement of choking (Hill et al., 2010a). Taking into consideration the recommendations purported by Beilock and Gray (2007), an individual will only experience a choke if they are motivated to perform, thus the subjective response of the individual need consideration. Furthermore, an individual may not have choked when rated by the objective measure, but if the individual has perceived themselves to have choked, then this may still have negative ramifications on an individual's cognitions, affect and behaviour. Thus, due to the aforementioned issues with performance measures and conceptualisation of choking, it could be argued that the research has failed to consistently and efficiently examine the choking process (Edwards, Hardy, Kingston, & Gould, 2002; Hill et al., 2010a, Mellalieu, Hanton, & O'Brien, 2004; Otten, 2009). Therefore, future research should look to adopt both a subjective and consistent objective measure to allow for greater clarity of choking and its possible mechanisms to be had.

To date, the majority of research has focussed on the mechanisms associated with each paradoxical performance (Hill et al., 2010a; Lobinger et al., 2014), with relatively little research conducted on the potential predictors, particularly of the yips (Hill et al., 2010a; Lobinger et al., 2014). Therefore, the aim of this literature review of the yips and choking is three fold: 1) to explore the different mechanisms associated; 2) to explore the limited research on the potential psychological predictors and; 3) to discuss the PhD rationale, aims and objectives. The literature review section will provide an overview of the theory and studies associated with each. In 2010, Hill et al. (2010a) completed a literature review exploring all the literature to date on choking in sport. However, to date there is yet to be a review of the yips literature in sport, as such chapter two will detail a systematic review of the yips literature.

1.2 Literature Review

1.2.1 The Yips

Smith et al. (2000, 2003) developed an etiological continuum model to explain the yips based on golfers' descriptions of their symptoms, with physiological origins (type-I, focal dystonia) anchoring one end, and psychological origins (type-II, performance anxiety) at the other. This model was based on golfer's descriptions of their yips symptoms. They identified that type-I athletes experience focal-dystonia (movement disorder) symptoms only, which includes jerks and tremor. In contrast, type-II athletes experience symptoms of choking, such as anxiety and self-consciousness. The authors did highlight that individuals may experience both symptoms, however it is not clear if individuals can experience extreme levels of both. Therefore, this has important implications on classifying athletes effectively as qualitative reports have revealed that athletes have experienced both psychological and physical symptoms simultaneously (Bawden & Maynard, 2001; Philippen & Lobinger, 2012).

Stinear et al. (2006) found partial support for this etiological model, by using a range of psychological, physiological and performance measures with golfers. They found that both yips groups (type-I and II) experienced greater muscle activity than non-affected golfers in both high and low-pressure environments. During the low-pressure trial, the type-I golfers experienced significantly higher levels of muscle activity than the control group. Unsurprisingly, the greatest muscle activity was witnessed during the high-pressure trial for all groups. This suggests that type-I golfers experienced high muscle activity during low and high-pressure trials, whereas, the type-II golfers' muscle activation was only influenced by a pressure stimulus. As expected, the type-II golfers experienced significantly higher levels of cognitive anxiety in the high-pressure trials, which negatively impacted putting accuracy. However, caution is warranted when interpreting these findings due to the questionable validity and reliability of the measures utilised by Stinear et al., and small sample sizes (only powered to detect large effect sizes), given only 24 participants were recruited (type-I n = 8, type-II n = 7, control n = 9) in total. Although, Smith et al. developed the continuum based on the reports of golfers, they do not specify if this model is only relevant to golfers. Consequently, this model should be applied to other sports and professions, where individuals need to repetitively perform fine motor-based movements which require high levels of concentration, in order to test its applicability.

Given the complexity of the yips symptoms and different classifications proposed by Smith et al. (2000, 2003), there have been a number of mechanisms proposed to explain the aetiology of the yips. These mechanisms can be categorised into two different types: neuromuscular in nature and psycho-physiological in nature. Throughout this section we will we will explore the neuromuscular mechanisms in the form of focal dystonia's, and the psycho-physiological mechanisms in the form of the anxiety and performance, respectively, to gain a greater understanding of type-I and type-II yips.

1.2.2 Type-I Mechanisms - Focal-Dystonia

There are a number of different movement disorders or dystonia's that have different clinical manifestations, yet they all share one key feature; they are characterised by "*involuntary sustained or intermittent muscle contractions, which cause abnormal postures, and/or repetitive movements"* (Jinnah et al., 2013, p. 927). Specifically, type-I yips is characterised by a task-specific focal-dystonia, which affects highly skilled and overlearned tasks. For example, this would be putting in golf or bowling in cricket. Tasks outside of sport may include writing or playing an instrument (Torres-Russotto & Perlmutter, 2008). A fundamental factor of a dystonia is the presence of a phasic-dystonic movement (Lobinger et al., 2014). This involves individuals experiencing shorts bursts of co-contractions of antagonists and agonists muscles, resulting in a twitch or jerky movement when trying to execute their sporting task (Lim et al., 2001). These symptoms occur approximately within 500ms and 1500ms (3000ms for complex movements) prior to a self-initiated tasks (Lim et al., 2001). This supports the uncontrollability of the yips symptoms experienced by yips-affected athletes.

In most sports, where the yips are experienced, the dystonia is localised to the upper limbs. This is particularly evident in golf, cricket, darts and archery, where yips symptoms are dominated by involuntary contractions of the hand and forearm musculature, resulting in awkward, uncoordinated movements of the hand, wrist and/or fingers (Chen, Wassermann, Canos, & Hallett, 1997). In line with this, research has found that yips-affected golfers had higher forearm muscle activation and exert greater grip force on the putter than their unaffected counterparts during putting execution (Adler, Crews, Hentz, Smith, & Caviness, 2005; Smith et al., 2003) resulting in the jerk and tremor action reported by athletes (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2012). This suggests that those yips-affected golfers had a greater muscle activation than those unaffected golfers, supporting its inclusion as a focal dystonia. Furthermore, Merriman, Newmark, Hochberg, Shahani and Leffert (1986) reported that increasing the intensity and duration of time using the affected limb, actually further impairs the limbs symptoms. This may provide an explanation as to why some athletes have suffered for prolonged periods during their careers, such as Eric Bristow and Bernhard Langer (Kunicki, 2002; White 1996), even resulting in some players giving up their sports temporarily, or in extreme cases permanently such as Stephen Hendry (BBC Sport, 2010; Smith et al., 2000). Furthermore, McDaniel et al. (1989) reported that of 93 yips-affected male golfers recruited, 49% experienced symptoms in both hands. Interestingly, within a year this percentage had increased to 60%, and within four years this was 100%, highlighting the progressive and detrimental impact of experiencing these symptoms.

Tasks affected by focal dystonia symptoms require three main characteristics: highly repetitive tasks; extreme motor precision and interplay between conscious and at least feedback related modulation such as a golfer reading the green; and a repetitive executed motor plan (Utti, Vingerhoets, & Tsui, 1995). It is evident that all sports (e.g., golf, cricket, darts and archery) and professions (e.g., musicians, surgeons, and dentists; Altenmüller & Jabusch, 2009) where neuromuscular disorders occur, require highly repetitive precision based movements. Furthermore, it is apparent that in order to become an expert in these professions or sports, practice is essential. As such, these professions and sports meet the criteria for those susceptible to experience dystonia. Indeed, to ensure that dystonia's were correctly diagnosed, as opposed to another neurological disorder, Albanese and Lalli (2009) further provided a clinical checklist, which included three factors: 1) if muscles not usually involved in the movement, start to contract, this is known as overflow; 2) is a movement called mirror dystonia, characterised by the dystonic movement of the affected limb during the desired action with the opposite limb; and 3) the effectiveness of sensory tricks in the reduction of the dystonic symptoms. These tricks include proprioceptive sensory input close to the affected limbs, for example a golfer wearing a glove. However, the physiological rationale for these sensory tricks and their direct implications are still questionable due to the lack of theoretical underpinning and, thus warrants further investigation (Cheng, Grobbach, & Altenmüller, 2013; Lobinger et al., 2014).

Due to the complexity of focal dystonia, the exact aetiology and subsequent mechanisms still remain unclear (Torres-Russotto & Perlmutter, 2008). However, multiple pathophysiological mechanisms and risk factors have been proposed (Torres-Russotto & Perlmutter, 2008). Indeed, evidence suggests that irregularities within the basal ganglia and its connections, have implications on the experience of focal dystonia (Blood, Flaherty, & Choi, 2004). However, research has highlighted that this may reflect, or include, dysfunctions with dopaminergic, which influence the connections to the basal ganglia (Levy & Hallett, 2002). This is particularly important as the basal ganglia controls voluntary motor control and learning of routine behaviours (Jinnah & Hess, 2006). In addition, sensory misinformation, due to lack of cortical inhibition has been suggested to have direct implications on the sensory feedback system (Lim et al., 2001). Sanger and Merzenich (2000) identified that inaccurate sensory feedback can lead to abnormal motor behaviour, whereby a disproportionate amount of motor cortical cells is fired, by using a range of different muscular tasks and assessing muscle activation. This results in involuntary muscle activation such as muscular contraction or overflow of movements, for example, the golfer experiencing a jerk or tremor in the affected limbs, thus emphasising the potential role of being able to control motor cortical cell activation and the experience of focal dystonia.

A third potential mechanism refers to plasticity at different levels, for instance how the brain pathways activate different stimuli (Altenmüller & Jabusch, 2009; Torres-Russotto & Perlmutter, 2008). The influence of cortical plasticity is particularly pertinent with fine motor precision skills that have been extensively practiced, as overlapping of bordering sensorimotor representations (other learned movements) can occur, resulting in the movement disorder symptoms (Munte, Altenmüller, & Janacke, 2002). Consequently, if individuals try to recover a desired action of a specific body part, when there is a lack of specificity, it can lead to a co-activation (the range of different putts a golfer can use) of the bordering or antagonists muscles, leading to issues with the desired action. Finally, sensorimotor "remapping" refers to a dramatic change in one's technique of the desired action. In order to improve the skill, repetitive movements are required to optimise performance to improve speed, accuracy and fluency of the movement. Sensorimotor mapping allows for this consolidation to occur (Paquet et al., 2008). As such, a dramatic change to this sensorimotor map can trigger a dysfunction of the basal ganglia. Whilst these studies have attempted to identify the mechanisms and risks associated with focal dystonia, further research is needed to identify these mechanisms further.

Within the dystonia literature, the role of psychological characteristics has been debated. Early research identified that psychological factors contribute less to the prevalence of focal dystonia's than neurological or physiological aspects (Sheehy & Marsden, 1982). Yet other researchers have cast doubt on these claims, highlighting some psychological factors are associated with different forms of dystonia, for example obsessive compulsive disorder, heightened anxiety, and psycho-social distress are associated with focal dystonia (Bihari, Hill, & Murphy, 1992; Scheidt et al., 1996a; Scheidt, Schuller, Rayki, Kommerell, & Deuschl, 1996b). For example, Lim et al. (2001) suggested that psychological issues may have a greater impact on performance for musicians than the neurological issues, proposing that this may be due to the stress and anxiety associated with performance (e.g., prior to a concert, the constraints of the instrument and hours practised and overuse). Furthermore, Kolle (2000) established that musicians who suffered with fine motor skill problems and/or hand dystonia reported suffering higher levels of anxiety and stress, which focussed their attention unrelentingly on improving their performance. Consequently, this has important implications on understanding the development of the yips in sport, given the role of competition pressure experienced by athletes. This may also provide a rationale for the suggestion that the yips may develop after a significant choking or multiple choking events (Lobinger et al., 2014).

Early research into task-specific focal dystonia's suggested that anxiety was a consequence of but not a cause of these physical symptoms (Lim et al., 2001). However, there has been a conceptual change in our understanding of the role of anxiety, due to the increased awareness of the role of the corticostriatal circuits in the development of psychiatric symptoms (Ron, 2009), particularly as decreased cortical inhibition has also been observed in subjects with high levels of trait anxiety (Lencer et al., 2009). This has led some researchers to suggest that movement and psychiatric abnormalities, in fact are manifestations of the same neuropsychiatric disorder (Enders et al., 2011; Lencer et al., 2009; Ron, 2009). Lencer et al. (2009) proposed that the abnormal neural activity in motor loops linking the basal ganglia via the thalamus to the frontal cortex witnessed in those who experience focal dystonia's, may influence or be influenced by the neighbouring limbic loops which mediate limbic, cognitive and attentional functions. Thus, hampering both affective and motor processes (Alexander, Crutcher, & DeLong, 1990). This highlights the potential role that trait anxiety may play as a mechanism and potential predictor for experiencing focal dystonia symptoms. The role of trait anxiety as a predictor will be covered in the predictors section of this literature review section.

1.2.3 Type-II Mechanisms - Choking

Athletes who suffer predominantly with type-II yips experience more psychological related symptoms, similar to those found in choking (Smith et al., 2000, 2003). Specifically, athletes report that performance is worsened during competitive environments that are explicitly associated with perseverative cognitions and anxiety. It has been suggested by Masters (1992) and Klampfl et al. (2013a) that the yips may potentially be a severe or more chronic form of choking, which has been supported by qualitative accounts of yips-affected athletes (Bawden & Maynard, 2001; Bennett, Hays, Lindsay, Olusanga, & Maynard, 2015). Accordingly, it is important to have an understanding of the anxiety and performance relationship when trying to understand type-II yips. There are a number of theories that attempt to provide an explanation for the anxiety-performance relationship and the associated mechanisms for choking. In a review of the choking literature, Hill et al. (2010a) categorised these theories as either drive theories or attentional theories.

Drive theories are based on the influence of arousal and anxiety in the pursuit of optimal performance under pressure, which result in a detrimental impact on performance (Lobinger et al., 2014). The most popular drive theory to explain the relationship between anxiety and performance is the Multidimensional Anxiety Theory (Martens, Burton, Vealey, Bump, & Smith, 1990) which derives from the original Inverted U Hypothesis (Yerkes & Dodson, 1908) and Drive Theory (Spence & Spence, 1966). The Multidimensional Anxiety Theory proposes that cognitive anxiety has a negative linear relationship with performance, somatic anxiety has an inverted U relationship with performance and confidence has a positive relationship with performance. Yet a major limitation of this theory is that it adopts a unidimensional approach and there are inconclusive findings regarding its predictions where no relationship was found between cognitive anxiety and performance (Chamberlain & Hale, 2007; Kais & Raudsepp, 2005).

Due to these limitations, particularly the unidimensional approach, Hardy (1990) proposed the Cusp Catastrophe Model to explore the interactive effects between cognitive anxiety, physiological arousal (not somatic anxiety) and performance, albeit this model is not considered a drive theory (Hill et al. 2010a). They proposed that physiological arousal acted as a mediating factor on the cognitive anxiety and performance relationship, whereby, high levels of cognitive anxiety, would only have a deterioration on performance, when high levels of physiological arousal were present. As with the Multidimensional Anxiety Theory, research testing these predictions remain inconclusive (Hardy, Beattie, & Woodman, 2007; Hardy & Parfitt, 1991; Hardy, Parfitt, & Pates, 1994). One possible explanation for this, is the questionable ecological validity of these studies. In particular, the manner in which physiological arousal was induced for example, physical load (to increasing heart rate) rather than psychological stress (Hardy et al., 2007). This suggests that these studies may have failed to induce physiological arousal from a performance stressor. Furthermore, it has been suggested that there is great difficulty in testing this model's predictions effectively within a lab environment, again, due to the lack of ecological validity (Hill et al., 2010a). In summary, both models provide reasonable descriptions for what happens to performance under cognitive anxiety and physiological arousal or somatic anxiety.

The attentional theories provide an alternative perspective to understanding the anxiety-performance relationship, by proposing an explanation as to why these types of performance occur (i.e. choking; Eysenck & Derakshan, 2011; Hill et al., 2010a; Masters & Maxwell, 2008). Given the current thesis aims to provide a greater understanding into why these types of performances happen, the main focus of this section will focus on two alternate attentional theories: distraction and self-focus.

1.2.3.1 Distraction approach

Distraction theories identify that anxiety related thoughts induced by pressure (i.e., cognitive anxiety) will consume finite working memory resources (Baddeley, 1986). This is particularly pertinent, and so limit the amount of resources available for task completion. Baddeley (1986) proposed that the working memory has three key components: the central executive, the phonological-articulatory loop and the visuo-spatial sketch pad. The central executive is the most important part of the working memory as its functions includes processing information and self-regulating functions such as performance monitoring, planning and strategy selection (Baddeley, 1986). It is also responsible for processing the effects of worry and anxiety (arguably the most important aspects from a performance under pressure perspective). The phonological-articulatory loop and the visuo-spatial sketch pad are used for verbal rehearsal and transient storage of speech-based input (articulatory loop) and visual-based input (visuo-spatial sketch). Miyake et al. (2000) reported that the central executive has three major functions: inhibition, shifting and updating. Inhibition refers to "*One's ability to deliberately inhibit dominant automatic or prepotent responses when necessary"* (p.57), therefore having attentional control to resist interference from task-irrelevant stimuli. Shifting refers to "*Shifting back and forth between multiple tasks, operations or mental sets"* (p.55) therefore being able to allocate attention between the task-specific demands. Lastly updating refers to *"Updating and monitoring of working memory representations"* (p.56). Therefore, all three functions play key roles in allowing individuals to perform at an optimum level.

Attentional Control Theory (ACT: Eysenck & Derakshan, 2011; Eysenck et al., 2007) is the most recognised distraction theory. This is an extension of the Processing Efficiency Theory (PET: Eysenck & Calvo, 1992), which was developed in accordance with Baddeley's (1986) working memory system model. The PET proposes that worry, the central construct of cognitive state anxiety, has two major implications for working memory. First, an increase in worry will consume key processing and storage resources as individuals shift their attention to threat-related, task-unrelated stimuli. These stimuli can manifest in both internal (worrisome thoughts) and external (task-irrelevant threatening distractors) sources (Eysenck & Derakshan, 2011). Consequently, if a task requires a substantial demand on the working memory capacity, any adverse effects of cognitive state anxiety will have detrimental impacts on performance: so a choke may occur. A second facet of this model suggests that the presence of worrisome thoughts may stem from an awareness of task importance and thus potentially act as a motivational influence for the central executive functions (Eysenck & Calvo, 1992; Eysenck & Derakshan, 2011; Eysenck et al., 2007; Williams, Vickers, & Rodrigues, 2002). Here, individuals invest additional processing resources, through increasing effort, and through developing strategies to try and improve performance (Eysenck & Calvo, 1992; Eysenck et al., 2007), thus compensating for the potential negative performance implications (Williams et al., 2002; Wilson, 2008). However, Eysenck and Calvo (1992) suggest that additional attentional resources will only be invested (increased effort) if individuals perceive that there is a chance of success. However, only a finite amount of additional resources can be invested. Once this threshold is met, the working memory will be overwhelmed and therefore a level of processing inefficiency will be experienced that cannot be overcome by effort or motivation alone (Williams et al., 2002). Therefore, it is possible for some athletes to maintain or even improve performance in pressure situations by using these additional resources for task-relevant cues. Alternatively, when an athlete experiences a choke, it may not be the case that the athlete has not invested maximum effort in order to perform successfully, but rather their central executive functions may be overwhelmed.

Another key aspect of PET is the theoretical distinction between processing efficiency and performance effectiveness (Eysenck & Calvo, 1992). Performance effectiveness refers to the quality of the performance by the individual, whereas processing efficiency refers to the relationship between the performance effectiveness and the amount of processing resources expended (Cooke et al., 2010; Eysenck & Calvo, 1992; Eysenck et al., 2007). Processing inefficiency occurs due to an imbalance between two attentional systems: goal-directed attentional system (current goals, expectations and knowledge) and the stimulus-driven attentional system (responding maximally to salient and conspicuous stimuli). Anxiety disrupts this balance by increasing the provision of resources on to the stimulus-driven attentional system and decreasing the provision of resources on the goal-directed attentional system (Eysenck & Calvo, 1992; Eysenck et al., 2007). As such, when a task requires minimal attentional resources for successful performance, the negative implications of anxiety may not directly influence performance due to the number of attentional resources available (Cooke et al., 2010; Eysenck & Calvo, 1992; Eysenck et al., 2007; Williams et al., 2002). However, if performance requires high attentional demands, then regardless of invested effort, performance effectiveness and processing efficiency will be impaired (Eysenck & Calvo, 1992; Eysenck & Derakshan, 2011; Eysenck et al., 2007; Hardy, 1996a; Williams et al., 2002). Therefore, an athlete is more likely to experience a choke, when there is a high demand on task resource for performance effectiveness, and processing inefficiency occurs.

A number of limitations of the PET have been highlighted (Eysenck & Calvo, 1992). For instance, there is a lack of theoretical underpinning in the model to support the effects of distracting stimuli on anxious individuals (Eysenck et al., 2007). The PET suggested that anxiety also effected the phonological loop and visuo-spatial pad alongside the central executive. However, a number of studies find that high trait anxiety only impaired performance on tasks involving the central executive functions (Eysenck et al., 2005; Eysenck, Payne, & Derakshan, 2005) and not on any of tasks involving phonological loop and visuo-spatial pad (Christopher & MacDonald, 2005; Walkenhorst & Crowe, 2009). This is particularly pertinent given the plethora of empirical literature suggesting that distracting stimuli can have a greater negative impact on highly anxious individuals compared to non-anxious individuals (Eysenck & Calvo, 1992; Eysenck & Graydon, 1989; Wilson, 2008). In order to account for these possible limitations Eysenck and colleagues (2007; 2011) proposed the ACT as an extension of the PET.

The ACT provides a more comprehensive proposal for the implications of anxiety on the central executive proposing four key hypothesis. The first hypothesis focuses on the premise of processing efficiency, a key component of the PET, which has received numerous empirical support within the literature (e.g., Derakshan & Eysenck, 2009). The second hypothesis proposes that anxiety impairs the inhibition function of the central executive. Indeed, empirical research has highlighted that highly anxious individuals were more vulnerable to distraction than their low anxious counterparts (Pacheco-Ungietti, Acosta, Callejas, & Lupianez, 2010; Pacheco-Ungietti, Lupianez, & Acosta, 2009). Wilson, Vine and Wood (2009) found that heightened anxiety reduced the quiet eye period (i.e., the final fixation to a target before the initiation of the motor response) in a basketball free-throw task using eye tracking. Two potential causes for this effect have been proposed. First, the processing inefficiency experienced by those highly anxious individuals' manifests in a greater activation in brain areas associated with attentional control. Second, Bishop (2009) suggests that actually this inefficient processing is due to a failure of these areas of the brain to engage with the task, proposing a reduction in activation of the brain. However, both aetiologies propose that anxiety has negative implications on the role of the inhibition function. Therefore, those individuals who are more susceptible to pressure environments, due to high trait anxiety, are more likely to focus on irrelevant stimuli and thus experience a choke. The third hypothesis proposes that anxiety impairs the shifting functions of the central executive. Wilson et al. (2009) found support for this hypothesis, with the aid of eye tracking during a basketball free throwing task. They reported high anxiety increased the variability in the gaze to more target locations in the vicinity of the hoop for shorter durations, rather than shifting between the task-specific demands (ball and hoop). Furthermore, this impairment has been evidenced even when performance deterioration has not (Wager, Jonidis, & Reading, 2004). The final hypothesis proposed that anxiety impairs processing efficiency more than performance effectiveness, which also supports the findings of Wager et al. (2004). A number of empirical studies have suggested that high anxiety can be associated with greater brain activity than low anxiety even when there are no effects on performance exhibited when assessing brain activity (Bishop, 2009; Righi, Mecacci, & Viggiano, 2009; Savostyanov et al., 2009). These findings are pertinent from a theoretical perspective as these methodologies include a range of tasks aimed at placing varying demands on the inhibition and shifting functions of the central executive (Eysenck & Derakshan, 2011). Thus they demonstrate the potential negative influence anxiety and worrisome thoughts may have on performance effectiveness in high-pressure situations, when processing is inefficient.

In conclusion, the ACT provides a comprehensive theoretical underpinning concerning the mechanisms and the attentional cognitive processes to explain why performance breaks down under pressure (Eysenck & Calvo, 1992; Eysenck & Derakshan, 2011; Eysenck et al., 2007; Wilson et al., 2009). Although this theory has tried to consider how trait anxiety can influence performance, the precise mechanisms and conditions under which the negative effects of anxiety occur are still uncertain (Owens, Stevenson, Hadwin, & Norgate, 2012). This also provides just one approach to explaining why performance breakdown under pressure. Self-focus theories provide an alternative proposal to explain why pressure has a negative impact on performance (Beilock & Carr, 2001; Masters, 1992).

1.2.3.2 Self-Focus Approach

The premise of self-focus theories centres on skill development processes and the level of cognitive input required by the athletes (Masters & Maxwell, 2008). When acquiring a skill an athlete will pass through a set of developmental stages (cognitive, associative and autonomous) identified by Fitts and Posner (1967). Each stage can be differentiated by the type of knowledge the athlete requires and the control available to guide performance (Anderson, 1982; Schneider & Shriffin, 1977). During the early stages of skill acquisition, the knowledge is explicit (knowledge that is rule based, verbalised and available to consciousness), very slow and effortful to complete. When the individual practises the skill, the movement will become, faster, smoother, more efficient and the processing will be more covert and require little working memory to execute. Therefore, the performance becomes more automatic or implicit (knowledge that is abstract, unavailable to consciousness and non-verbalised) and does not require any resources of the working memory to execute (Masters & Maxwell, 2008). This process is of particular importance for understanding the self-focus theories associated with the anxiety-performance relationship.

There are two prominent self-focus theories: the Explicit-Monitoring Hypothesis (EMH: Beilock & Carr, 2001) and the Conscious Processing Hypothesis (CPH: Masters, 1992). Both theories share a number of similarities and propose that when a skilled performer is motivated to perform and experiences cognitive anxiety, particularly perseverative cognitions associated with pressured performance, they have a tendency to focus on the process of the performance to ensure a successful outcome (Baumeister, 1984; Beilock & Carr, 2011; Hill et al., 2010a; Jackson, Ashford, & Norsworthy, 2006; Masters, 1992). This focus is known as reinvestment which Masters and Maxwell (2004) defined as the *"manipulation of conscious explicit rule based knowledge by working memory, to control the mechanics of one's movements during motor input"* (p.208). This reinvested explicit knowledge of the already mastered skill, causes individuals to revert to an earlier stage of learning (Fitts & Posner, 1967). In addition, the reinvested thoughts consume valuable working memory resources away from other task-relevant cues. Consequently, a drop in performance is likely to ensue, as the unconscious, faster, automatic action (implicit knowledge) is inhibited by the slower conscious action (explicit knowledge), resulting in an uncoordinated movement. The cause of this interference is the key conceptual distinction between the CPH and EMH. The EMH proposes that the uncoordinated action manifests due to individuals monitoring the step by step execution of the tasks, whereas, the CPH suggests that this action is the result of an athlete trying to consciously control the skill execution. Indeed, Jackson et al. (2006) suggest trying to control the action rather than monitoring the action will have greater detrimental implications on performance. Particularly, in order to gain conscious control individuals, break down the continuous automatic processes, into smaller separate units (Masters, 1992). These separate units then require explicit knowledge to activate, slowing down performance and allowing for the opportunity of performance errors to occur, that would not during automatic movements (Wilson, Smith, & Holmes, 2007).

Masters (1992) suggests this process of conscious processing may provide an explanation for why performance deteriorates in severe forms of choking and the yips. Klampfl, Lobinger and Raab (2013a, b) found no support for this link between reinvestment and the yips, however they did identify that this may be due to the multi-etiological nature of the yips, and not classifying yips based on the sub-types. Furthermore, research has identified that obsessional thinking about performance was higher in those yips-affected athletes (Bawden & Maynard, 2001; McDaniels et al., 1989; Smith et al., 2000). Within the qualitative reports, the yips-affected athletes highlighted increasing effort in order to perform their skills efficiently, thus it is possible that some form of reinvestment occurred, potentially supporting the CPH as a potential explanation of the yips (Masters, 1992), yet further research is needed.

Empirical research has provided support for the CPH's choking explanation (Gray, Allsop, & Williams, 2013; Gucciardi & Dimmock, 2008; Murayama, Sekiya, & Tanaka, 2010; Tanaka & Sekiya, 2010; Toner & Moran, 2011). For instance, Gucciardi and Dimmock (2008) found that experienced golfers, who experienced heightened levels of cognitive anxiety during an explicit knowledge condition, assigned extra attentional resources to the task, in an attempt to consciously control their action, resulting in a drop in performance. This was not experienced in the other conditions (task-irrelevant and swing conditions). Other research has suggested performance deterioration occurred due to elite athletes attempting to consciously change their movement kinematics when experiencing performance anxiety (Gray, et al., 2013; Murayama, et al. 2010; Tanaka & Sekiya, 2010; Tonor & Moran, 2011). The key limitation of this literature however is that the majority of literature has primarily focussed on performance outcome such as the number of putts holed and the final location of the ball from the pin (Beilock & Carr, 2001; Guiccardi & Dimmock, 2008; Jackson et al., 2006; Wilson, Chattington, Marple-Horvat, & Smith, 2007). Outcome measures alone do not provide insight into whether reinvestment or conscious control has occurred. For instance, Gray et al. (2013) identified that a detailed kinematic analysis is a more direct indicator of golfing performance than outcome measures alone. Similarly, in recent reviews of choking (Hill et al., 2010a) it was proposed that research needs to consider and implement a design that assess detailed kinematic variables in conjunction with outcome measures.

In summary, the ACT and CPH provide alternate explanations for performance under pressure, however, there is a debate as to which is the most appropriate to explain choking and type-II yips (Guicciardi & Dimmock, 2008; Masters et al., 1992; Mullen, Hardy, & Tattersill, 2005). In 2001, Hardy et al. reported that conscious processing effects were more likely to explain choking in more complex tasks. However, the ACT proposes that this drop in performance is related to exceeding the attentional capacity, where CPH, may provide an explanation for why the attentional capacity becomes exceeded (Mullen & Hardy, 2000). This is particularly pertinent given that processing efficiency is impacted by anxiety and worrisome thoughts (Eysenck & Derakshan, 2011), and the CPH may explain processing efficiency impairment. Furthermore, both CPH and ACT processes may provide justification for the difference in findings in brain activity for processing efficiency when looking at the inhibition function of the working memory (Bishop, 2009). Indeed, ACT principles may explain lower brain activation as these areas fail to engage with the task (Bishop, 2009), whereas greater brain activation may coincide with the explicit monitoring associated with EMH and CPH models (Masters & Maxwell, 2008). Therefore, a combination of these theories potentially provides a more comprehensive explanation of the processes of choking, and even the yips. Therefore, future research testing performance under pressure experimentally should aim to test both these explanations simultaneously.

1.2.4 The combination of both Focal Dystonia and Choking

It is clear that task-specific focal dystonia and choking serve as anchor points of Smith et al.'s (2000, 2003) continuum. However, there are a number of key influencing factors which can differentiate the yips from being solely a focal dystonia (Marquardt, 2009). For instance, the prevalence rate of task-specific focal dystonia is considerably lower in other professions compared to sport: for example, the 1% highlighted in musicians (Altenmuller, 2003) compared to the 28%-54% highlighted in golf (McDaniel et al., 1989; Smith et al., 2000). This considerably higher rate would suggest that the yips is more than just a relatively rare movement disorder (Lobinger et al., 2014).

A second mitigating factor relates to the status of yips-affected athletes, specifically, research has highlighted athletes of all ages and experience have suffered with the yips (McDaniel et al., 1989; Sachdev et al., 1992; Smith et al., 2000). This is of particular interest, as other task specific focal dystonia's are experienced by master or professional individuals, with a peak age of manifestation during the mid-30's, predominately those who perform under high societal pressure (Jinnah et al., 2013). This difference would suggest that the yips may not be solely a cause of impaired brain processes associated with the basal ganglia connections, due to excessive overuse of muscles as highlighted in the focal dystonia section (Levy & Hallett, 2002).

With these factors in mind, Marquardt (2009) provided an alternative explanation for the yips that may help enlighten the role of both the psychological and neuromuscular components of the disorder. Marquardt proposed that the yips should be deemed a contextual movement disorder. He suggests that the neuromuscular symptoms are only exhibited in specific contexts, due to golfers no longer experiencing their symptoms once the golf ball was removed from in front of them. Furthermore, Marquardt concluded that the jerking component of the yips was "*an interference in the execution of an open loop movement and the activation of a feedback controlled, closed loop"* (p. 74). Thus, incorporating some of the key explanations for the anxiety-performance relationship alluded to previously. Moreover, Marquardt proposed that when an athlete first experiences the yips they enter a vicious cycle, comprising four key components, whereby the yips symptoms can be experienced at any of these stages: anxiety, over control, interference and perception (See figure 1.1).

'Content removed for copyright reasons'

Figure 1-1: *Marquardt's (2009) vicious cycle involved in the development of the yips*

As previously highlighted, anxiety can act as a potential cause of the yips symptoms (Enders et al., 2011; Jabusch & Altenmuller, 2004; Lehn, Mellick, & Boyle, 2014) but also as a potential aggravator of them (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). Marquardt (2009) proposes that anxiety acts solely as an aggravator of the symptoms, whereby individuals who exhibit heightened levels of anxiety and/or lack of confidence experience an increased severity of yips symptoms. The anxiety can stem from an avoidance of failure or focusing on the potential consequences of missing a vital putt. The second facet of the cycle focuses on the individual trying to consciously or sub-consciously control the impact of their symptoms. This can be through individuals increasing the explicit knowledge or by trying to perfect their actions, which incorporates elements of reinvestment theories (Masters, 1992; Master & Maxwell, 2008). The third aspect of the vicious cycle (Marquardt, 2009) is interference which refers to when the open loop movement being impeded by a second conflicting movement that manifests in a jerking movement. This is particularly evidenced in anticipation of the desired action (i.e., putting the ball). Finally, if the individual perceives this physical interference or jerking action, then this can result in a pathologic putting problem. An individual's perception can lead to an increase of anxiety in anticipation of experiencing the symptoms again, followed by further interference thus accelerating the cycle. Consequently, increasing self-perception and self-rating play a key role in the experience of the yips, further emphasising the potential role that individual differences may play in understanding the yips and choking.

To summarise, in this section a number of potential explanations that are pertinent to the yips and choking have been reviewed, particularly the role of automatic and cognitive factors of motor control and execution. In particular, this section has highlighted that although there is a plethora of literature on the potential mechanisms of focal dystonia's and choking, the research testing these in yips samples specifically is lacking. Therefore, it is important to test these mechanisms to gain further insight into the types of mechanisms pertinent to the yips classifications (Smith et al., 2000; 2003). Furthermore, an understanding of the potential predictors associated with these forms of paradoxical performance may aid with the understanding of these mechanisms. Yet to date, this area of the literature has received limited attention.

1.2.5 Potential Psychological Predictors

In this next section the limited research on the psychological predictors of both choking and the yips will be reviewed and critiqued. Particular attention will be given to anxiety, personality, perfectionism and self-consciousness as they have been studied most extensively.

1.2.5.1 Anxiety

The role of anxiety has been discussed as a mechanism for the experience of the yips. Yet anxiety has also been proposed as a potential predictor of these experiences. For instance, research has reported that trait anxiety increased the likelihood for musicians being diagnosed with focal dystonia (Enders et al., 2011; Jabusch & Altenmuller, 2004; Lehn, et al., 2014). This finding particularly supported Lencer et al.'s (2009) proposal (highlighted earlier) that high levels of trait anxiety and focal dystonia both show decreased levels of cortical inhibition (See section 1.2.2.). Altenmüller and Jabusch (2009) further suggested professional pressure (anxiety) and perfectionism as facilitating factors for the onset of musician's dystonia. However, it is worth noting that it is unclear how these psychological characteristics contribute to dystonia symptoms, and whether they are pre-existent or psycho-reactive (Lehn et al., 2014).

When investigating the role of anxiety in the yips, Smith et al. (2000) reported that yips-affected golfers suffered from increasing levels of anxiety prior to: competition, performing a putt they felt they should make, facing a specific opponent, and attempting a difficult putt. However, studies that have investigated the role of trait anxiety, found no differences between yips-affected and non-affected golfers (Adler et al., 2011; Klampfl, et al., 2013b; Sachdev, 1992). This contrasts with the findings of yips compared to musician's dystonia (e.g., Enders et al., 2011), but may be due to the larger sample sizes recruited and the more discrete definition of musician's dystonia. However, in qualitative accounts (Bawden & Maynard, 2001; Bennett et al. 2015) of the yips, anxiety has been highlighted to play a key role in the experience. Interestingly, although Stinear et al. (2006) found no differences between trait measures of anxiety, they reported differences in state measures of anxiety immediately before performance. Therefore, an individual's perception or interpretation of anxiety may be a greater explanation for the effect on performance than intensity alone (Hanton, Mellaliey, & Hall, 2004). Indeed, Hanton, Matthews and Fleming (2010b) found that elite golfers reported they negatively interpreted anxiety symptoms before they experienced a choke. As such a negative interpretation can lead to greater levels of attentional resource being consumed by task-irrelevant thoughts, which is a key premise of the ACT (Eysenck & Derakshan, 2011). Yet the role of interpretation of anxiety, rather than intensity has not been investigated as a potential predictor within the yips, and therefore warrants future investigation.

1.2.5.2 Personality

Understanding why certain individuals experience choking performance and others experience clutch performances, and the role of personality has received limited attention (Allen, Greenless, & Jones, 2013; Byrne, Silasi-Mansat, & Worthy, 2015). This may be due to inherent complications associated with the temporal dimensions of performance and personality (Geukes, Mesagno, Hanrahan, & Kellman, 2012). For example, personality is categorised as being a relatively stable factor over time (Allen et al., 2013; Geukes et al., 2012), whereas, performance is characterised by situational specific behavioural outcomes. Thus, in order to predict performance under pressure, this requires a theory or model of personality which explains why certain traits can predict certain actions or outcomes (Geukes et al., 2012). This may account for the abundant research on mechanisms than predictors of paradoxical performance.

One theoretical approach to understanding personality in performance under pressure is the trait activation theory, which proposes that how individuals interact with their situation is based on their traits, as an explanation for behaviour formulated by trait-relevant cues witnessed in situational environments (Tett & Guterman, 2000). For instance, the main focus of this theory relies on the importance of situation-trait relevance, in order to comprehend which situations specific personality traits are likely to influence a behaviour (Lievens, Chasteen, Day, & Christiansen, 2006). These situations are considered trait-relevant, as they provide cues for the expression of trait-related behaviour (Tett & Guterman, 2000). For example, Tett and Gutterman (2000) provide an example of assessing aggression in individuals at a religious service as ineffective, as there are little cues here that would provoke aggressive behaviour. Another influencing factor within this theory is the role of situation strength. For instance, strong situations are evidenced by explicit behavioural demands, where the outcomes of the behaviour are clearly understood, widely shared and accepted (Mischel, 1973). On the contrary, weak situations are characterised by more unambiguous expectations, allowing greater changeability in behaviour responses.

Trait relevance and strength signify discrete characteristics of situations that figure into the concept of trait activation potential (Tett & Burnett, 2003). These traits are usually incorporated within a five factor model framework such as the five factor model/theory of personality (McCrae & Costa, 2008; McCrae & John, 1992). These five factors (neuroticism, extraversion, openness, agreeableness and conscientiousness) were initially proposed by Tupes and Christal (1961) and supported by Norman (1963), however researchers did not value the importance and significance of these factors until the 1980s (McCrae & John, 1992) when research using the Sixteen Personality Factor Questionnaire (16PF; Cattell, Eber, & Tatsuoka, 1970) and trait adjectives (such as self-reports and peer ratings) revealed factors that were similar to the originally proposed five factors. These five dimensions are derived from the assessment of language which epitomises the natural categories used by individuals when they define and evaluate social behaviours, and how these differ (e.g., Costa & McCrae, 1992; Goldberg, 1992; Haaland, & Christiansen, 2002; Lievens et al., 2006; Lievens, De Fruyt, & Van Dam, 2001). Therefore, each of the five factors encompass a number of more focussed traits. For instance, the neuroticism factor evaluates the level to which individuals are susceptible to emotional stability, thus, encompassing aspects of hostility, depression, anxiety, self-consciousness, vulnerability and impulsiveness (Allen et al., 2013). Moreover, the factor of extraversion assesses the quantity and intensity of interpersonal interactions; openness assesses an individual's inclination towards seeking out new experiences; whilst agreeableness assesses an individual's apprehension towards social harmony and cooperation; and finally, conscientiousness which assesses an individual's goal directed behaviour and organisation (Allen et al., 2013; Costa & McCrea, 1992).

The assessment of personality within the sporting environment is limited when compared to other environments such as academia and business environments (Allen et al., 2013). Furthermore, the research to date within sport has focused mainly on differences in personality in those individuals who are elite level athletes and those who are not (Allen et al., 2011; Woodman et al., 2010). Indeed, Allen et al. (2011) reported that athletes who competed internationally had lower levels of neuroticism, and higher levels of conscientiousness and agreeableness, than those who competed nationally. Interestingly, Woodman et al. (2010)

identified that within elite gymnastics, conscientiousness was positively associated with the quality of the athlete's preparation leading up to competition. Furthermore, Woodman et al. found that emotional stability was positively associated with an ability to effectively cope with competition. This provides a key insight into performance, however, limited research has investigated the role of personality traits within paradoxical performance. To date, there is only one study which investigates the role of the Big-Five in any form of paradoxical performance, specifically choking (Byrne et al., 2015).

Byrne et al. (2015) investigated the role of the Big-Five in an individual's performance under low and high-pressure in a two study paper. First, participants completed a decision making task under low and high-pressure stimulus. Regression analyses revealed that higher levels of neuroticism were associated with reduced performance during decision making tasks under social pressure. During a second study different participants performed the same decision making task under social and time pressure, and again the findings revealed that neuroticism was negatively associated with performance. This was also the case for agreeableness in experiment two. One key limitation of the second study, however, was that the researchers used the same data for the control group from experiment one. Byrne et al. concluded that individuals may experience choking, due to processes associated with the ACT (Eysenck & Dereksham, 2011) where the attentional resources are consumed by anxious and worrisome thoughts. They further suggest that future research is needed to investigate the role of individual differences in performance under pressure. This research highlights the importance of individual differences in predicting performance under pressure.

1.2.5.3 Perfectionism

Perfectionism is a multi-dimensional concept that is characterised by the setting of and pursuit of, extremely high goals in conjunction with severe criticism (self and others) of one's behaviour (Frost, Marsten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991). Within the literature of perfectionism and performance, the precise nature of perfectionism is still debateable. For instance, Hewitt and Flett (1991) proposed that perfectionism contain three key components: self-orientated perfectionism (self-imposed tendency to strive toward perfectionism by establishing high standards in which they evaluate themselves by), socially prescribed perfectionism (where individuals experience pressure to be perfect originating from significant others, and they must achieve this to be valued by others) and other-oriented perfectionism. In contrast, Frost et al.'s (1990) multidimensional perfectionism model proposes that perfectionism consists of six key dimensions: personal standards; organisation; concern over mistakes; doubts about actions, parental expectations and parental criticisms. Although there is literature which focuses on both models (Roberts, Rotherham, Maynard, Thomas, & Woodman, 2013; Gaudreau & Verner-Filion, 2012); Frost et al.'s (1990) model remains widely accepted as the more popular of the two models within perfectionism researchers (Cox, Enns, & Clara, 2002; Frost & Steketee, 1997; Roberts et al., 2013).

Interestingly, a growing agreement within the literature is that perfectionism can act in two broad dimensions: perfectionistic strivings and perfection concerns (Dunkley, Zureoff, & Blanstein, 2003; Stoeber & Otto, 2006). This model provides an integrated approach to both the aforementioned models (Frost et al., 1990; Hewitt & Fleet, 1991). Perfectionistic striving suggests a dimension related to setting high standards and striving for perfectionism. This includes the organisation and personal standards of Frost et al.'s (1990) model. Perfectionistic concerns relate to being highly self-critical, which incorporates the facets of concern over mistakes, doubts about actions, parental concerns and parental expectations of Frost et al.'s (1990) model. Stoeber and Otto (2006) however, suggest that aspects of parental concerns and expectations are associated more with the developments of perfectionism, as opposed to being a fundamental facet of perfectionistic concerns. This categorisation of perfectionism allows for the distinction between those who exhibit "healthy" and "unhealthy" forms of perfectionism. Healthy perfectionists are those who display high levels of perfectionistic strivings and low levels of perfectionistic concerns, whereas "unhealthy" levels of perfectionism are exhibited through both high levels of perfectionistic strivings and perfectionistic concerns (Stoeber & Otto, 2006). This classification may help understanding as to why perfectionism, as a whole, has been identified as a psychological construct associated with Olympic champions (Gould, Dieffenbach, & Moffet, 2002), and as a hindrance to athletic performance as well (Fleet & Hewitt, 2005).

To date the literature within healthy and unhealthy perfectionism has highlighted that healthy perfectionists experience more positive outcomes of increased performance (Cox et al., 2002), increased confidence (Hall, Kerr, & Matthews, 1998; Koivula, Hassmen & Fallby, 2002) and partake in task orientated forms of coping (Gaudrau & Antl, 2008). In contrast, unhealthy perfectionism is strongly linked with maladaptive constructs such as anxiety, depression and neuroticism (Koivula et al., 2002; Parker, 1997; Rice & Mirzadeh, 2000). Accordingly, it is important to be able to differentiate between perfectionistic striving and perfectionistic concerns. Yet, Gotswal and Spencer-Cavaliere (2014) suggest that it is easier to identify unhealthy perfectionists compared to healthy perfectionists using qualitative measures. When reviewing coping mechanisms associated with challenging situations, unhealthy perfectionists exhibited higher self-criticism, considered quitting their sport, and were argumentative and confrontational with team mates (Gotswal, Stoeber, Dunn, & Stoll, 2012). Dunn, Causgrove, Dunn, Gamache and Holt (2014) supported these findings, suggesting that female intercollegiate volleyball players that were unhealthy perfectionists (high perfectionistic striving, high perfectionistic concerns) were more likely to adopt avoidance strategies like disengaging in behaviour compared to those healthy perfectionists (high perfectionistic striving, low perfectionistic concerns) who were more likely to adopt problem/task-focused coping strategies such as increased effort and active coping. Further, they suggested that healthy perfectionists (*n* =52) and unhealthy perfectionists (*n* =52) were more prevalent than those non-perfectionists (low perfectionistic strivings, low perfectionistic concerns; *n*=31), concluding that two in five young athletes were classified as unhealthy perfectionists.

With regard to paradoxical performance, there is limited research suggesting perfectionism as a potential predictor of both choking (Guiccardi, Longbottom, Jackson, & Dimmock, 2010) and the yips (Roberts et al., 2013). Guiccardi et al. (2010) explored the experience of choking in 22 experienced golfers through semi-structured interviews (*n* =12) and focus groups (*n* = 10), revealing that when the golfers set excessively high standards and goals prior to a choke, it precipitated a feeling of anxiety. Furthermore, they highlighted that athletes who partook in critical evaluation of their performance post-choke, were susceptible to experiencing chronic forms of choking, and were likely to view similar situations as threatening. However, to date there is no empirical literature that investigates this link between perfectionism and choking.

To date, two studies have investigated perfectionism as a potential predictor of experiencing the yips in sport using Frost et al.'s (1990) multidimensional perfectionism scale (Klampfl et al., 2013b; Roberts et al., 2013) with contradictory findings. Klampfl et al. (2013b) found no difference between yips-affected golfers (*n* =20) and their unaffected counterparts (*n* = 20). However, Roberts et al. (2013) reported personal standards, organisation and concern over mistakes were associated with experiencing the yips. This suggests that yips-affected athletes exhibit an unhealthy perfectionism profile. It is worth noting, however, that the mean scores for perfectionism were low compared to other psychology studies which have identified healthy and unhealthy perfectionists in Roberts et al.'s study (Rice & Mirzadeh, 2000; Sapeja, Dunn, & Holt, 2011). A possible limitation of the Klampfl et al. study is they only recruited 20 participants in each group, while Roberts et al. recruited 60 in each. Therefore, Klampfl et al. study may only have been powered to detect large effect sizes. Another explanation may stem from both studies not classifying those yips-affected as either type-I or type-II and thus, Klampfl et al. findings may represent the multi-etiological nature of the yips. Yet, these studies do provide some interesting findings that warrant further investigation in sport, particularly given the potential role of perfectionism in Marquardts (2009) vicious cycle model in the over control stage. Potentially future research should use a more sport specific measure of perfectionism. This is important as general perfectionism measures may not be able to capture sport specific perfectionism such as expectations of the coach (Dunn, Craft, Dunn, & Gotswals, 2011). Accordingly, future research should adopt the Sports Multidimensional Perfectionism scale-2 (Dunn, Dunn, & Syrotuik, 2002) as it evaluates the six sub sections of Frosts et al.'s multidimensional perfectionism models (1990) with sport specific questions and within the current thesis, the current programme of research will look to investigate the role of perfectionism using both the general perfectionism and sport specific models to gain a greater understanding of perfectionism in both the yips and choking.

1.5.2.4 Self-Consciousness

The final potential psychological predictor of paradoxical performance is self-consciousness, however, the exact role of self-consciousness in paradoxical performance is still unclear. Baumeister (1984) proposed that trait levels of self-consciousness had a positive relationship with performance, due to individuals being de-sensitised to focussing inward. This has since been supported in subsequent studies (Beilock & Carr, 2001; Lewis & Linder, 1997). Yet other studies have indicated that athletes with high self-consciousness were more vulnerable to self-focus during pressure situations and thus more likely to choke (Geukes, Mesano, Hanrahan, & Kellmann, 2013a; Liao & Masters, 2002; Mesagno et al., 2011, 2012; Wang, Marchant, Morris, & Gibbs, 2004). However, this has yet to be tested experimentally using a yips-affected sample. Interestingly, qualitative research exploring choking (Guicciardi et al., 2010; Hill et al., 2010b, Hill & Shaw, 2013) and the yips (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011) has revealed that these athletes reported experiencing extreme levels of self-consciousness as an influencing factor on their anxiety symptoms. Contributing factors to these feelings of self-consciousness include self-presentational concerns, self-judgement and social evaluation (negative appraisal) amongst the athletes which are all considered within the trait measure of self-consciousness.

Trait self-consciousness can be divided into three forms (Feningstein, Scheier, & Buss, 1975): private self-consciousness; public self-consciousness and social anxiety. The qualitative and quantitative research highlighting self-consciousness as a potential predictor of paradoxical performance is no surprise given the role self-focus plays in the mechanisms of choking highlighted before. This is particularly pertinent as private self-consciousness is defined as being "*concerned with attending to one's inner thoughts and feelings"* (Feningstein et al., 1975, p.523). Given the trait-activation principle researchers have suggested that this disposition to direct feelings inwards may be associated with choking and the de-automatisation of skills (Beilock & Carr, 2001; Masters, 1992). In recent studies, Geukes et al. (2013a) and Mesagno et al. (2009) reported higher levels of private self-consciousness were exhibited in those who experienced choking under private and mixed-pressure environments. This suggests that high levels of private self-consciousness are a potential predictor of choking. The alternative findings proposed by Baumeister (1984) found a positive relationship between self-consciousness and performance. However, it is worth noting that Baumeister conceptualised self-consciousness as a combination of private self-consciousness and public self-consciousness, therefore direct comparisons cannot be made. This is of particular interest, as Geukes et al. (2012a) and Wang et al. (2004) separated the subscales and proposed that private self-consciousness and not public self-consciousness was a predictor of performance under pressure. However, this does not paint a complete picture of the role of self-consciousness, as the studies have used a range of different tasks to test their hypotheses. For example, Baumeister used a roll up (commercial game) and video game tasks that were unknown to their participants and thus required individuals to invest attentional resources of their working memory. In contrast, Geukes et al. and Wang et al. used tasks familiar to the subjects in that they were automatic fine motor skills such as handball, basketball etc. Thus, these may provide alternative explanations given the role of self-focus and distraction mechanisms discussed earlier. Therefore, further investigation of the role of private self-consciousness is warranted in both choking and yips-affected athletes.

The role of public self-consciousness, which is defined as "*a general awareness of the self as a social object that has an effect on others"* (Feningstein et al., 1975, p.523) within paradoxical performance is still debated as some findings have suggested that it has a positive relationship with performance under pressure (Geukes et al., 2013b) supporting the suggestion by Baumeister (1984) that individuals become de-sensitised to self-focus. However, Geukes et al. (2013a, 2013b) and Mesgano (2009) revealed that public self-consciousness was displayed in individuals who experienced choking under public, high-pressure conditions compared to those who had not. Together they suggest public self-consciousness as a potential predicator for performance. As with private self-consciousness, the exact role of public self-consciousness is still yet to be determined and warrants further investigation in both forms of paradoxical performance.

The final factor of self-consciousness is social anxiety, which is defined as "*a discomfort in the presence of others"* (Feningstein et al., 1975, p.523). Interestingly, a number of recent studies have not measured the role of social anxiety, when measuring private self-consciousness and public self-consciousness in performance under pressure (e.g., Geukes et al., 2013a, 2013b). However, Dandy, Brewer and Tottman (2001) found social anxiety to be positively related to experiencing a choke during basketball free-throw shooting. Similarly, Wang et al. (2004) reported that social anxiety had a negative relationship with change in performance between low and high-pressure environments, again in basketball free throw shooting. This may support a trait activation approach as performance in sport occurs in very social environments and therefore, a discomfort in these situations may play a key role in the experience of paradoxical performance. As public self-consciousness and social anxiety represents self-consciousness associated with self-presentation, Mesagno et al. (2011) proposed a self-presentational model of choking suggesting that self-consciousness (in particular public self-consciousness) in conjunction with fear of negative evaluation (FNE) play a key role in the experience of a choke. An individual's FNE is the apprehension and fear associated with negative appraisal by the public when performing (Watson & Friend, 1969). Mesgano et al. (2012) reported that participants with high levels of FNE, were more likely to experience choking compared to those with low levels of FNE. Although to date, FNE, private self-consciousness, public self-consciousness and social anxiety have not been tested experimentally in the yips. However, yips-affected athletes have reported in interviews, that situations where there was an opportunity for negative appraisal, they experienced heightened levels of anxiety and self-focus which exacerbated the likelihood of experiencing yips symptoms (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). Accordingly, further research is warranted to investigate the role of private self-consciousness, public self-consciousness, social anxiety and FNE during the experience of choking and the yips.

In summary, a number of potential predictors that are pertinent to both forms of paradoxical performance have been reviewed, particularly anxiety, personality, perfectionism and self-consciousness. This section has highlighted that although these predictors have been highlighted as playing a role in the experience of both forms of paradoxical performance, they have stemmed predominately from qualitative sources (Guiccardi et al., 2010; Hill et al., 2013), particularly in the yips (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2012). Although, research within choking has investigated these predictors using quantitative measures (e.g., Geukes et al., 2012; Mesagno, 2009), research using a yips sample is lacking (e.g., Roberts et al., 2013). Therefore, it is important that when testing these factors quantitatively in the yips, that future research incorporates Smith et al.'s (2000, 2003) continuum model, to identify if any psychological predictors are more pertinent to different yips classifications. This section has also highlighted that although research is investigating these predictors, the research focuses on these individually (e.g., Roberts et al., 2013). Given the complexities of the yips aetiologies, future research should adopt a more comprehensive approach incorporating a range of predictors simultaneously, as this may provide a greater understanding of likely interactions influencing both the yips and choking.

1.3 Current PhD Thesis

To this point we have discussed the key mechanisms, predictors and literature associated with both choking and the yips. This final section will discuss the rationale for this PhD thesis and address some of the methodology provisions adopted, followed by the PhD aims and objectives.

Due to the nature of effectively testing the predictors and mechanisms, a range of methodological approaches will be adopted. This type of approach allows for a greater understanding of psychological phenomena (Rohleder & Lyons, 2015), in this case paradoxical performances. Furthermore, a combination of qualitative and quantitative methods can provide a complementary approach to addressing a research question and provide multiples perspectives on what is relevant and important (Vernon, 2015). This section will address each of these different methods alongside the rationale for each approach used in the systematic review and three studies included in this PhD thesis.

As highlighted in this literature review, severely choking-affected and type-II yips-affected athletes experience many similar symptoms such as self-consciousness (Bawden & Maynard, 2001; Bennett et al., 2015; Guiccardi et al., 2010). Further, it has been suggested that the yips may be a conditioned reaction to multiple previous choking experiences or one particularly emotion laden choking experience (Lobinger et al., 2014). Therefore, both forms of paradoxical performance, choking and the yips, will be investigated in order to explore any similar or potentially different mechanisms and predictors associated with them. This will build on the already extensive literature within the choking performance (Hill et al., 2010a) alongside developing the limited research within the yips (Lobinger et al., 2014).

Although research into the yips is in its infancy in sport, recent work has investigated a range of potential predictors and mechanisms associated with the yips (Adler et al., 2011; Bell & Thompson, 2007; Philippen & Lobinger, 2012; Roberts et al., 2013; Rotherham, Maynard, Thomas, Bawden, & Francis, 2012). Yet it is unclear how these psychological characteristics (self-consciousness, perfectionism etc.) contribute to dystonia symptoms and whether they are pre-existent or psycho-reactive (Lehn et al., 2014). Furthermore, there is still a dearth of research on the role of physiological, biomechanical and neurological factors within the yips and the implications they have on performance. To date, there has been no published review of the literature associated with movement disorders in sport such as the yips. With this in mind, the first objective of the current PhD thesis will be to conduct a systematic review to pull together all the research to date (end of 2013) on the yips in sport. Systematic reviews, have become increasingly popular in comparison to traditional reviews, due to some researchers highlighting the tendency of traditional reviews to be descriptive which seldom make sense of the collection of studies reviewed (Goodger, Gorely, Lavallee, & Harwood, 2007; Noblit & Hare, 1988). Systematic reviews allow for a more structured approach, which follows specific guidelines to ensure validity in comparison to traditional reviews (Moher, Libeati, Tetzlaff & Altman, 2009). The current thesis will look to employ a systematic review to encompass sports where athletes report experiencing focal-dystonia or yips-like symptoms to ensure potentially important studies or case studies are not overlooked and to acknowledge the breadth of yips definitions available.

To date literature in the yips and choking has been predominately focussed on the influence of paradoxical performances in golf, specifically in the case of the yips research (e.g., Klampfl et al., 2013a, 2013b). Yet, other sports have reported similar symptoms such as "dartitis" in darts and "target-panic" in archery, thus warranting further investigation of the yips in other sport. This research is essential, not just to further understanding of these forms of the yips, but also to establish if Smith et al.'s (2003) yips continuum for golfers can be applied to other sports. Accordingly, the second objective of the current PhD, is to explore the personal experiences of elite level archers who have experienced both target-panic and choking. This will allow for an identification of any potential predictors associated with the yips in archery, whilst building on previous accounts of the yips and choking in other sports (Bawden & Maynard, 2001; Bennett et al., 2015; Guiccardi et al., 2010; Hill et al., 2010b; Philippen & Lobinger, 2012). To allow for richer data to be obtained, it is imperative to use professional athletes, as any inconsistencies in their performance are magnified due to their mastery of skill, their status and their awareness, and therefore, they are best placed to discuss performance under pressure (Hill et al., 2010a).

This study will conduct a thematic analysis using the guidelines proposed by Braun and Clarke (2006) as the form of qualitative analyses for study one of this PhD thesis. This approach allows for a flexible, systematic and rigorous approach to developing themes (Howitt, 2010). The researchers will adopt a realist approach, whereby there is a reality that exists independently from an individual's understanding or belief of a certain phenomenon (O'Reilly & Kiyimba, 2015), and is an epistemological approach that fits for thematic analysis (Braun, Clarke, & Hayfield, 2015). Willig (2013) identifies that this approach can allow qualitative studies to explore what is really going on in a phenomenon. Thus, gaining an understanding of the experience of target-panic and choking in elite level archery performance.

The next objective of this PhD, will be to explore the role that the potential predictors highlighted in: this literature review (anxiety, perfectionism, personality and self-consciousness); and those reported in the systematic review and qualitative accounts within this thesis, play within the experience of both choking and the yips. This will be achieved through an online questionnaire using elite level golfers and archers. Internet mediated research allows for psychology studies to recruit participants from diverse sections of the world (Hewson, Vogel, & Laurent, 2015) whilst maintaining anonymity and it can be accessed at a person's own convenience, without the need for human interaction (Mitchel, Vella-Brodrick, & Klein, 2010). This is particularly important for accessing elite level athletes from across the world, which can fit into their busy schedule.

The final objective of this thesis will be to test these potential predictors highlighted in the aforementioned studies in a pressured environment. Furthermore, this will allow for testing of some of the key mechanisms associated with performance under pressure in both choking and yips literature such as the ACT and Reinvestment theories (Eysenck & Derakshan, 2011; Masters, 1992; Masters & Maxwell, 2008). The majority of literature to date testing the yips and choking in a laboratory environment, has focussed on psychological, physiological and kinematic variables separately (e.g., Geukes et al., 2012; Mesagno et al., 2009). Therefore, the current thesis will look to adopt a similar approach to Cooke, et al. (2010) by assessing a range of psychological trait (predictors), state (anxiety), kinematic and physiological variables during both high and low-pressure performance in golf and archery performance.

In summary, by completing this PhD's objectives, we aim to provide a greater understanding of the yips phenomenon by understanding its symptoms in all sports so that a definition can be developed that best encompasses all its facets, which is inclusive of all sports and not just golf. In doing so, this thesis will also look to provide greater clarification of some of the potential predictors and mechanisms associated with two of the most experienced forms of paradoxical performance in the yips and choking. This will add to the limited but growing pool of literature that exists in both these fields of research (Hill et al., 2010; Lobinger et al., 2014).

1.4 PhD aims and objectives

The current research aims to:

1. Develop a definition that best encompasses all aspects of the yips (Study one).
2. Investigate the potential predictors associated with the yips and choking (Study one, two, three and four).
3. Investigate the potential mechanisms associated with the yips and choking (Study four).

In order to achieve these aims, there are five key objectives to the current thesis.

I. Review the existing psychological, physiological and neurological components associated with the yips in sport (Study one).

II. Qualitatively explore the experience of elite level archers to gain an understanding of potential predictors associated with target-panic (yips in archery) and choking (Study two).

III. Quantitatively explore the role of potential predictors on experiencing both the yips and choking (study three).

IV. Explore the applicability of Smith et al.'s (2003) model of the yips in golf and target-panic (form of the yips) in archery (Study three and four).

V. Explore the mechanisms associated with the yips and choking in a high-pressure environment (Study four).

Chapter 2: The Yips in Sport: A Systematic Review[1]

To date there has been no attempt to provide a comprehensive review of literature on the yips and other movement disorders in sport. As a review of the choking literature was completed by Hill and colleagues in 2010, it was important that a review of the yips literature was completed to ensure that a clear understanding of both the yips and choking was evidenced before the PhD's experimental studies commenced. This chapter will look to provide the first systematic review of the yips literature to date. In doing so this will address the first aim of the current thesis which is to develop a definition that best encompasses all aspects of the yips. This will be achieved by completing objective one of this thesis which is to review the existing psychological, physiological and neurological components associated with the yips in sport prior to the end of the year 2013. These findings will also provide some insight into the potential predictors and mechanisms associated with the yips (aim two and three). This systematic review has been published in the International Review of Sport and Exercise Psychology in 2015.

2.1 Introduction

In many sports successful performance is heavily reliant on the execution of fine motor skills (Smith et al., 2003). The "yips" phenomenon is a disorder that disrupts the execution of automatic fine motor tasks (Bawden & Maynard, 2001), and has been observed in high-pressure environments, such as competition, where 28 - 54% of golfers with low handicaps have experienced it (McDaniel, et al. 1989, Smith et al., 2000). The majority of the research within the yips literature has focused on golf, although anecdotal evidence suggests that symptoms of the yips are also experienced in darts (dartitis), snooker (yips) and archery (target-panic).

The popular media have been instrumental in disseminating the term "yips", using it in relation to accounts of retirements and the dramatic declines in performance of world class athletes. Bernhard Langer (two-time major golf champion), Steven Hendry (seven-time world snooker champion) and Eric Bristow (five-time world darts champion) have all reported experiencing the yips, but it is evident from each case that the problem manifests itself differently depending on the sport in question. Langer described how he would experience

[1] Clarke, P., Sheffield, D., & Akehurst, S. (2015). The yips in Sport: A systematic review. *International Review of Sport and Exercise Psychology*, *8*(1), 156-184

“twitches” and would sometimes double hit the ball in one putt (White, 1993). Hendry explained that *“on some shots I don’t even get the cue through”* leading him to feel that before each game he was 50 points down on his opponent (BBC Sport, 2010). And Bristow described a similar yips phenomenon stating that he *“brought the dart back, got halfway through throwing it and could not let go, I don’t know how I got it or how I got rid of it, but I had it for 10 years”* (Honeyball, 2004, pg 1). Unlike Langer and Hendry who used the term the yips, Bristow acknowledged that he suffered with “dartitis”, the yips in darts (Roberts, Rotherham, Maynard, Thomas, & Woodman, 2013).

In addition to differences in how athletes describe the yips, there is a lack of consensus on an academic definition of this disorder (Pelz, 1989; Philippen & Lonbinger, 2012; Smith et al., 2003). Although it was first described as an occupational cramp (Foster, 1977), Pelz (1989) reported that professional golf teachers defined the yips as a fail-safe shutdown which surfaced due to a decline of confidence stemming from unsound golf stroke mechanics. This definition was expanded by Smith et al. (2003) who identified that athletes subjectively reported focal-dystonia and/or psychological symptoms. These subjective reports were used to develop a continuum anchored by focal-dystonia symptoms (type-I yips) and psychological symptoms (e.g., anxiety) associated with performing under pressure (type-II yips). The term focal-dystonia refers to a neurological disorder characterised by sustained muscle contractions that result in spasms, twisting and abnormal posturing of a specific body part (Lim, Altenmuller, & Bradshaw, 2001). Smith et al. (2000) identified the yips in golf as being a *“psycho-neuromuscular impediment affecting the execution of the putting stroke”* (p.424). Although the model was developed for golfers, it is possible to apply it to other sports in which the yips are prevalent. More recently, Philippen and Lobinger (2012) identified the yips as an involuntary muscle contraction that manifests in jerks, tremors or freezing of a planned movement, sending the ball to an unpredictable destination. From the definitions and the anecdotal evidence, it is evident that although the yips manifest differently across sports (e.g., putter control versus releasing a dart), the symptoms suffered are similar, such as an interruption in the execution of the movement (jerk, tremor, and freezing) of the sport specific limb/s accompanied by anxiety. Thus, there are psychological, neurological and physiological components associated with the yips. Some research suggests that the yips are instigated by a focal-dystonia, which is exacerbated by anxiety (McDaniel et al., 1989; Sachdev, 1992; Smith et al., 2000); however, the precise aetiology of the disorder is unclear.

Research on musicians may provide further insight into the aetiology of the yips. Musicians also have to perform fine motor skills under pressure in order to succeed. Konczak and Abbruzzese (2013) identify musician's dystonia as a neurological motor disorder characterised by involuntary contractions of the associated muscle akin to type-I yips. Lim et al. (2001) suggest that these focal-dystonia symptoms are caused by neurological abnormalities or disruptions to the basal ganglia circuitry, aging or genetics, which are exacerbated under pressure. Conversely, Jabusch and Altenmuller (2004) and Lehn, et al. (2014) reported that psychological components such as trait anxiety and obsessive compulsive symptoms increase the likelihood of musicians being diagnosed with focal-dystonia. Altenmuller and Jabusch (2009) also suggest professional pressure (anxiety) and perfectionism as facilitating factors for the onset of musician dystonia, similar to the yips. Although research into the yips is in its infancy in sport, recent work has examined the potential predictors and associated mechanisms (Adler et al., 2011; Bell & Thompson, 2007, Philippen & Lobinger, 2012; Roberts et al., 2013; Rotherham et al., 2012). However, it is unclear how these psychological characteristics contribute to dystonia symptoms, and whether they are pre-existent or psycho-reactive (Lehn et al., 2014). Due to these ambiguities and a lack of clarity in the predictors and mechanisms of the yips, this review aims to systematically examine the literature on the yips in sport. This review includes other sports (e.g., table tennis, petanque and darts) in which athlete's report experiencing a focal-dystonia or yips-like symptoms to ensure potentially important studies are not overlooked and to acknowledge the breadth of yips definitions available. The primary aim of this chapter is to systematically review the psychological, neurological and physiological parameters of the yips and their impact on performance. This will provide a greater depth of understanding of this performance disorder, and inform research regarding interventions. This will further enable a greater understanding of the potential predictors and mechanisms associated with the yips, which will partially address aims two and three of the current thesis. A second aim of this review is to clarify and expand a definition of the yips across sports, so that it can be used by practitioners and researchers to classify athletes. As such, this will address the first aim of the thesis.

2.2 Method

2.2.1 Sources

The search strategy used three main approaches to locate published studies of yips in the sport setting: (1) electronic searches of computerised databases including Sports Discuss, PubMed, Science Direct and Library Plus; (2) citations in papers identified by the electronic searches, and (3) manual searching of specific journals from 1989 to 2013. The hand searched journals included *The Sport Psychologist*, *Journal of Sport Psychology, Journal of Applied Sport Psychology, Medicine and Science in Sport, Movement Disorders, and Neurology.* Smith et al.'s (2000*)* definition of the yips as "*a psycho-neuromuscular impediment affecting the execution of the putting stroke in golf*" (p.424) was operationalised to determine four key components of the yips: psychological, neurological, physiological, and performance. These components formed one aspect of the inclusion criteria. The inclusion criteria for articles consisted of: (1) a focus on sporting performance and/or description or discussion of the yips (not just choking); (2) a measurement of one characteristic associated with the yips (performance, physiological, psychological and neurological); and (3) been published in English and containing data pertinent to the yips. Articles containing expert opinions and unpublished studies or dissertations were excluded.

2.2.2 Procedure

The procedure followed the PRISMA checklist to ensure that the methodology was robust and valid (Moher et al., 2009). This includes four steps: identification, screening, eligibility and inclusion (see Figure 2.1). The identification stage consisted of searching through the databases using the keywords ("yips" and "sport"). Once searches had been completed, the screening and eligibility phases were conducted whereby hard copies of the publications were acquired and assessed to identify if they were relevant based on the inclusion criteria. The final sample of articles was then reviewed.

Sallis, Prochaska and Taylor (2000) recommend that only variables which have been identified three or more times should be coded in a systematic review. However, electromyography (EMG) and anxiety were the only variables in the reviewed literature that were researched three times or more. Consequently, all variables present in the literature were included in this systematic review. Detailed tables were created for coding the psychological, physiological, neurological and performance findings of the studies. Individual differences such as perfectionism and obsessive compulsiveness were categorised as psychological variables. A number of studies reported results for a combination of these components (psychological, physiological, neurological and performance), so component specific results were reported in each section of the review (Sallis et al., 2000).

The sample was described in terms of: sample size (*n*); sex (male and female); sport; age; years of experience; design; and method of data collection. The studies included groups whose participants were yips-affected, and groups of both yips-affected and non-affected participants. The key findings of articles were then summarised. The tables were created following the coding guidelines presented in the PRISMA checklist (Moher et al., 2009), which helps researchers to identify bias within the literature and advises on effective data extraction.

2.3 Results

2.3.1 General Findings

The database search yielded 3732 citations (see Figure 2.1); 2276 were removed due to duplications leaving 1456 citations. Inspection of the citation titles showed that 28 articles were relevant; of these, 25 articles met the inclusion criteria. Three citations were excluded due to: the full text not being in English; not using yips-affected athletes; and being a conference abstract. Of the remaining 25 studies, 18 focused on the yips in golf, two focused on long distance running and cricket, and one focused on tennis, petanque shooting, pistol shooting and table tennis, respectively. Twelve studies reported case study approaches, 11 studies adopted quantitative approaches and two studies adopted qualitative approaches. The sample sizes of the studies varied: four recruited more than 100 participants, five recruited 21-100 participants and 16 recruited fewer than 20 participants. The results are divided into four components: (1) psychological; (2) neurological; (3) physiological; and (4) performance. For each component, the research design and main findings are reported.

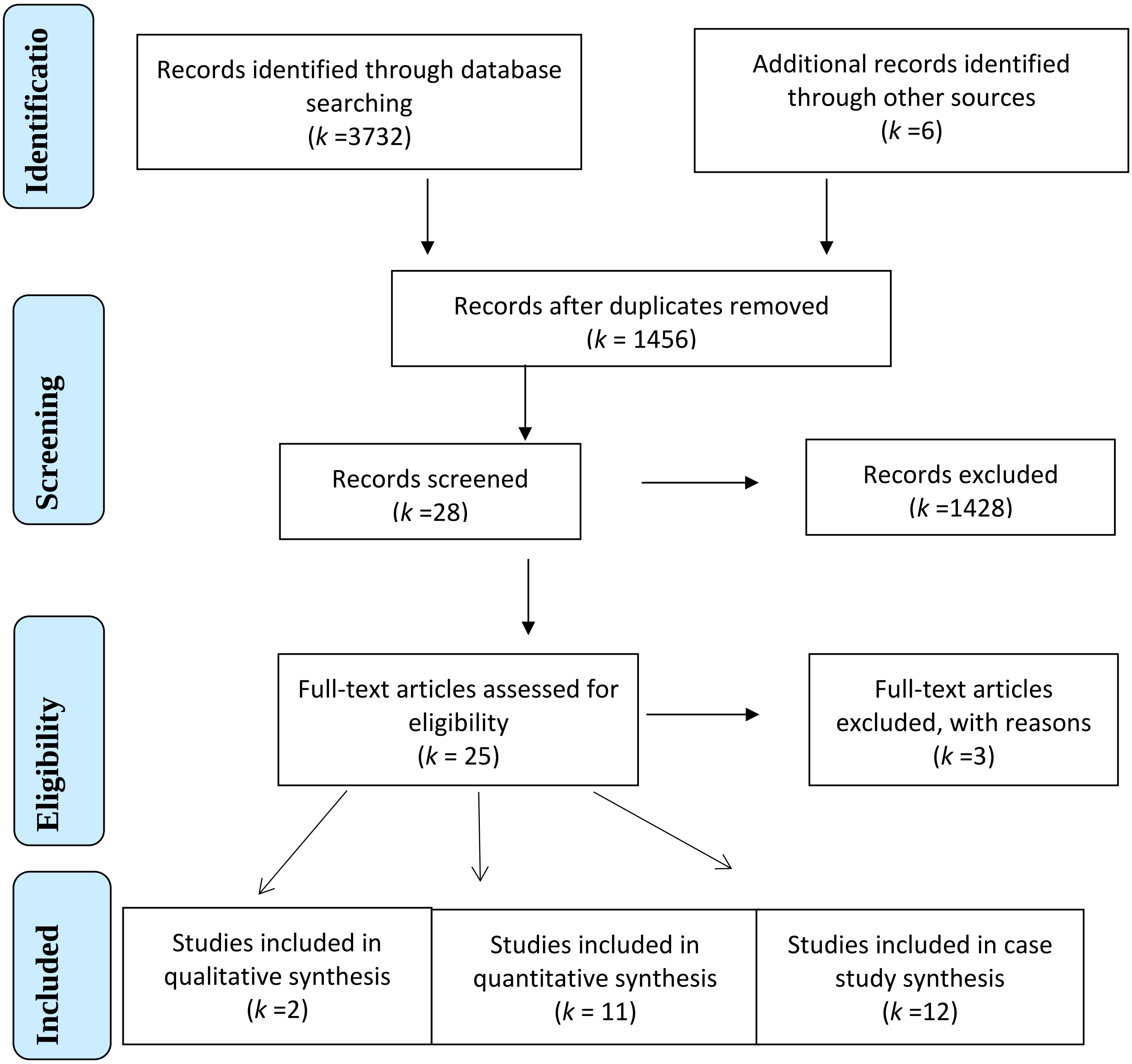

Figure 2-1: *Shows the procedure for the choosing of the journal sample*

2.3.1.1. General Demographics

A summary of the key demographics is displayed in table 2.1. A total of 1879 participants were used in investigating the yips, which consisted of 876 yips-affected and 1003 non-affected participants. It is clear from the literature that research exploring the yips in sport is male dominated (*k*=14). The remaining studies (*k*=11) used a combination of both males and females; however, these studies were also largely male dominated (1212= males, 131=females). It is unclear whether this is due to the number of females participating in those sports, or if the researchers did not contact females specifically. Thus, it is unclear if the yips is less prevalent in females.

Two studies reported that yips-affected athletes were significantly older than those not affected; however, one of these studies initially found no differences between the groups when the participants subjectively rated having the yips. Once the group was separated by those who suffered with visual yips (where type-I jerking or twisting movements of wrist or forearms were visually seen), then yips-affected participants were significantly older than those not affected. Furthermore, two studies found that yips-affected athletes had significantly more playing experience than those non-affected. Interestingly, Stinear, et al. (2006) identified that type-I golfers were more experienced than type-II and non-affected golfers, but there was no difference between type-II and non-affected golfers. Therefore, it appears that those who experience type-I symptoms are older and more experienced than those who suffer with type-II symptoms. The seven studies reporting no difference in age and experience did not specify whether athletes had type-I or type-II yips.

Due to the prevalence of golf studies in the sample, handicap was also reported. No studies have reported differences in handicap between those affected by yips and their non-affected counterparts. However, Adler et al. (2011) found that yips-affected golfers had a significantly higher “best handicap” than those non-affected. Therefore, before the onset of their yip symptoms the yips-affected golfers were significantly better than those not affected. Thus, the reporting of current handicap may provide an explanation for previous research that reported no difference between yips-affected and non-affected athletes. Finally, nine studies reported the duration that the participants had suffered with the yips symptoms ranging from 2-19 years; however, most of those studies did not characterise participants as having type-I or type-II yips.

Table 2.1:

Demographics of studies included

Study No.	Participants (Y/NY)	Sport	Sex		*M* Age (years)		*M* Years' Experience		*M* Handicap		*M* Duration of yips (years)
			M	*F*	*Yips*	*No Yips*	*Yips*	*No Yips*	*Yips*	*No-Yips*	
1	93=Y, 242= NY	Golf	335	0	50.5	47.5	35.6	31	#	#	#
2	20=Y, 20=NY	Golf	40	0	54.5 (12) *R= 23-72*	53.2 (11.4)	35.5 (14.1)	32.8 (16.3)	11.5 (6.3)	8.2 (5.3)	19.4
3*	1= Y	Tennis	1	0	34	#	10	#	#	#	6
4	453 =Y, 393 =NY	Golf	803	43	45.2 (15.1) *R= 17-81*	47.4 (14.6) *R= 16-87*	30.3 (14.1) *R= 4-65*	30.7 (13.6) *R=5-66*	4.5 (2.72) *R=-2.1- 11.5*	4.6 (2.9) *R= -3 – 12*	6 (8.2) *R= 0.01-60*
5	8=Y	Cricket	8	0	23.4 *R= 18-32*	#	11	#	#	#	#
6*	2= Y	Petanque	2	0	*R= 52-56*	#	*R=20-32*	#	#	#	#
7	72= Y	Golf	69	3	52	#	36	#	6.5 (3.9) *R=0-17.4*	#	#
8*	1= Y	Golf	1	0	65	#	#	#	14	#	2
9	10=Y, 10=NY	Golf	20	0	50.3 (14.9)	49.3 (17.8)	37.6 (12.4)	25.9 (16.9)	6.6 (6.3)	7.8 (6.4)	#
10*	5= Y	LD Running	3	2	*R= 30-58*	#	#	#	#	#	*R=2-12*
11	15= Y (8=TI, 7=T II), 9= NY	Golf	22	2	TI=61.8 (9.1) TII=54 (17.3) *R=25-75*	39.6 (19.3) *R=18-64*	TI=39.3 TII=23.4 *R=10-56*	21.6 R=5-48	TI=13.9 (9) TII=13.6 (9)	6.8 (7)	#
12*	1= Y	Golf	1	0	40	#	10	#	5	#	3
13*	1= Y	Golf	1	0	64	#	44	#	#	#	#
14*	2= Y	LD Running	1	1	*R= 40-57*	#	*R= 2-10*	#	#	#	*R=2-10*
15*	1= Y	Shooting	1	0	64	#	35	#	#	#	29
16*	3= Y	Golf	3	0	51	#	>24	#	6<	#	#
17	224 =NY, 40=Y. (21=Mild Y, 19=Heavy Y)	Golf	208	56	Mild Y= 48.7 Heavy Y= 47.6	44	#	#	Mild Y= 14.1 Heavy Y= 15.4	16.9	#

18*	4 = Y	Table Tennis	3	1	*R= 20-69*	#	*R= 4-22*	#	#	#	*R= 2-9*
19	25= Y, 25= NY. Visual: 17= Y, 33= NY	Golf	40	10	Y= 55.7(16.6) Visual Y= 55.6 (8.7)	NY= 44.5 (15.2) Visual NY= 39.7 (15.9)	#	#	Y=6.2 (5) Visual Y= 7.8 (4.3)	NY=5.4 (4.9) Visual NY=4.8 (5)	#
20*	1 =Y	Golf	1	0	49	#	#	#	4	#	6
21	17=Y	Golf	12	5	47.65 (15.61)	#	20.82 (16.42) *R= 4-60*	#	11.97 (11.23) *R= 0-33*	#	#
22	60= Y, 60= NY	Golf, Darts, Cricket	120	0	42 (10.2)	43 (9.4)	10.1 (6.1)	10.3 (5.8)	#	#	#
23*	2=Y	Golf	2	0	*R= 52-62*	#	#	#	#	#	#
24	19= Visual Y	Golf	15	4	55.9 (13)	#	11.2 (13.1)	#	21.9 (12)	#	#
25	20=Y, 20=NY	Golf	36	4	53.9 (13.9)	51.3 (14.1)	7.6 (5.2)	12 (13.1)	27.4 (17.5)	33.5 (18.7)	#

*= case studies. M= male, F=female, *M*=mean, *R*= Range, Y= Yips-affected, NY= Non-affected, LD running= Long distance running, TI= Type-I, TII= Type-II, #=not available. 1= McDaniel et al. (1989); 2= Sachdev (1992); 3= Mayer et al. (1999); 4= Smith et al. (2000); 5= Bawden & Maynard, (2001); 6= Lagueny et al. (2002); 7= Smith et al. (2003); 8= Rosted (2005); 9= Adler et al. (2005); 10= Wu & Jankovic (2006); 11= Stinear et al. (2006); 12= Bell & Thompson, (2007); 13= Ringman (2007); 14= Leveille & Clement, (2008); 15= Stiburana (2008); 16= Bell et al. (2009); 17= Marquardt, (2009); 18= Le Floch et al. (2010); 19= Adler et al. (2011); 20= Rotherham et al. (2013); 21= Philippen & Lobinger, (2012); 22= Roberts et al. (2013); 23= Dhungana & Jankovic, (2013); 24= Klampfl et al. (2013a); 25= Klampfl et al. (2013b).

2.3.2 Psychological studies

2.3.2.1 Research design of Psychological studies.

Nine studies used quantitative questionnaire-based approaches (golf, *k*=8; golf, cricket and darts together, *k*=1) and two articles used qualitative interviews to explore the yips (golf, *k*=1; cricket, *k*=1).

2.3.2.2 Main Findings of Psychological studies

Qualitative studies. To date, only two studies (Bawden & Maynard, 2001; Philippen & Lobinger, 2012; see table 2.2) have investigated yips-affected athletes using qualitative methods, namely interviews followed by thematic analysis. Bawden and Maynard (2001) focused on the experiences of bowlers in cricket. Eight bowlers of different standards (four club bowlers and four semi-professional bowlers) who suffered with the yips for an average of 11 years were interviewed. The transcripts generated 15 general dimensions. In particular, they reported that bowlers who suffered with the yips identified similar characteristics to those who suffered with severe forms of choking, such as inward thinking and conscious control (Jackson et al. 2006; Masters 1992).

Philippen and Lobinger (2012) explored the thoughts, feelings and focus of attention in 12 males and five females who suffered with the yips for an average of four years. The analysis focused on two main general dimensions: thoughts and feelings accompanying the yips-affected strokes and focus of attention during yips-affected strokes. Eleven participants reported that they primarily focused internally or on potential mistakes which accords with Bawden and Maynard (2001) and the choking literature (Hill, Hanton, Matthews, & Fleming, 2010a). However, it is not clear if this internal focus was pre-existent or psycho-reactive.

Quantitative studies. The majority of yips studies (*k*=9) investigating psychological constructs have been quantitative (see table 2.2). The psychological constructs include: trait anxiety (*k*=3), state anxiety (*k*=3), obsessive compulsive disorder (OCD; *k*=2) movement reinvestment (*k*=2), perfectionism (*k*=2), performance (*k*=2), personality (*k*=1), depression (*k*=1), coping strategies (*k*=1) and decision reinvestment (*k*=1). In addition, three studies focused on descriptions of the yips (McDaniel et al., 1989; Smith et al., 2000, 2003): they reported that the yips affected between 28% and 48% of golfers; symptoms were exacerbated under stressful situations; and symptoms had the largest impact on the short game, in particular putting. The symptoms were more pronounced when participants faced downhill, left-to right slopping putts, which were less than five feet from the hole. Furthermore, McDaniel et al. (1989) also found that 49% of those who suffered with the yips experienced progression to both hands (60% within a year, 100% within four years) and that the yips added approximately 4.7 strokes to a round of golf. Sachdev (1992) was the only study to report perceived severity of the yips, and found that it significantly correlated with the estimated number of strokes added to a round of golf.

Three studies measured trait anxiety using a variety of measures. Sachdev (1992), Klampfl, et al. (2013b) and Adler et al. (2011) measured trait anxiety using Spielberger's (1983) Trait Anxiety Inventory or the German version (Brand, Ehrlenspiel, & Graf, 2009), which shows test-retest reliabilities and concurrent validity (Spielberger, 1983). These studies found no difference in trait anxiety between those who suffered with the yips and those who did not. Klampfl et al. (2013b) also used the somatic complaints scale of the symptom checklist (Derogatis, Lipman, & Rickels, 1973) and found no differences between groups. Finally, Sachdev (1992) measured trait anxiety using the Somatization, Anxiety and Phobic Anxiety subscales of the Symptoms Check List-90 (Derogatis, et al., 1973) and the Childhood Separation Anxiety Scale (Gittelman & Klein, 1985), and again found no differences between the groups; however, they found that more anxious participants suffered with more yips symptoms.

Three studies measured state anxiety. Both Adler et al. (2011) and Klampfl et al. (2013b) found no difference in state anxiety in yips-affected and non-affected groups. In contrast, Stinear et al. (2006) used the Competitive State Anxiety Inventory-2 Revised (CSAI-2R: Martens, et al., 1990) and found a change in cognitive anxiety between high and low-pressure environments and identified that this impacted on putting accuracy. However, the CSAI-2R has questionable reliability (Craft, Magyar, Becker, & Feltz, 2003), so caution is warranted when interpreting these latter results. Thus, there is little evidence that trait or state anxiety is related to yips in non-competitive situations, but it may play a role in competition.

Reinvestment is the most recent psychological variable tested within the yips literature (Klampfl, et al., 2013a, 2013b). Reinvestment is defined as the attempt to consciously control one's movement during skill execution by the application of explicit and rule-based knowledge (Masters & Maxwell, 2008). However, two studies (Klampfl et al., 2013a, 2013b) found that movement specific reinvestment, as assessed by the German movement specific reinvestment scale (Klampfl et al., 2013b), and decision-specific reinvestment (Klampfl et al., 2013b) did not predict yips behaviour.

Obsessive compulsive disorder (OCD) is another psychological construct assessed in yips research. In an early study, McDaniel et al. (1989) identified that those yips-affected had reported more obsessional thoughts in response to an open-ended question. Adler et al. (2011) used Goodman et al.'s (1989) Obsessive Compulsive Scale (OCS) and Sachdev (1992) used the Leyton Obsessional Inventory (LOI; Cooper, 1970) to assess OCD, which are both valid and reliable scales. Both studies found no differences in obsessional thoughts between yips-affected and non-affected golfers, therefore casting doubt over the conclusions of McDaniel et al.

Other psychological constructs that have been investigated include personality, Type A behaviour pattern, depression (Sachdev, 1992) and perfectionism (Roberts et al., 2013). Sachdev measured personality using the Eysenck Personality Inventory (EPI; Eysenck & Eysenck, 1964), behaviour patterns using the Bortner Type A Behavior scale (BTBS; Bortner & Rosenman, 1967) and depression using the Zung Self-Rating Depression Scale (SRDS: Zung, 1965). All three measures are valid and reliable measurements (Edwards, Baglioni, & Cooper., 1990; Francis, Brown, & Philipchalk, 1992). Sachdev (1992) found no significant differences for any of these measures between yips-affected and non-affected groups. In contrast, perfectionism has been found to be related to the yips (Roberts et al., 2013) using the shortened version (Cox, et al., 2002) of Frost's Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) which is a valid and reliable measure of perfectionism in sport (Cox et al., 2002). It was found that personal standards, organisation and concern over mistakes were positively related to being yips-affected. Therefore, those with higher perfectionistic striving (personal standards, organisation) and perfectionistic concerns (concern over mistakes) were more likely to suffer with the yips in golf, darts and cricket. However, the authors acknowledge that the use of a cross-sectional design precludes inferring direct causality and the mean scores for perfectionism were very low compared with scores reported in previous mainstream psychology perfectionism studies (e.g., Rice & Mirzadeh, 2000; Sapieja, Dunn, & Holt, 2011). In contrast, Klampfl et al. (2013b) identified no significant difference between yips-affected golfers and non-affected golfers using the German versions of Frost's scale (Alstotter-Gleich & Bergemann, 2006). In summary, it is evident from the qualitative accounts that psychological factors are associated with the yips. However, experimental findings on psychological parameters have been inconclusive regarding their role in the yips (e.g., Sachdev, 1992; Stinear et al., 2006). Factors influencing this include: low sample sizes, measurements used, and the absence of participants identified as type-I or type-II.

Table 2.2:

Main psychological findings (Y=yips-affected, NY= non-affected).

Study No	Study design	Data collection	Main Findings
1	Questionnaires	Demographic and yips specific questions- obsessional thoughts.	Symptoms worse in tournaments when putting and chipping. No difference in occurrence of performance anxiety or handicap. Y golfers had higher obsessive thoughts than NY.
2	Questionnaires	Personality, anxiety, trait anxiety, depression, behaviour, obsessional thoughts and perceived severity (1-10).	No significant differences between any questionnaires for those yips-affected and non-affected. Severe yips rated themselves more anxious than mild yips-affected. Yips impacted their short game especially in competition. The perceived severity of the yips correlated with the estimated number of putts missed per round.
4	Questionnaires	Prevalence of the yips, environment, aspects of the yips common to focal-dystonia, yips features common to high anxiety and performance problems.	Both groups similar (n=72) for: number of games played and similar golf experience. Fast downhill putts from left to right putts from 2-5 feet increased prevalence of yips symptoms during competitive situations.
5	Interviews	Semi structured interviews. Analysed using thematic content analysis.	Higher order themes were (1) conditions before first experience of the yips (8%), (2) first experience of the yips (15%), (3) perceptions during the first experience of the yips (15%), (4) perceptions after first experience of the yips (3%), (5) perceptions of future performances (6%), (6) reasons for not wanting to bowl (7%), (7) the difference between bowling badly and the yips (3%), (8) characteristics of good bowling performance (5%), (9) personal characteristics (5%) and (10) personal explanation for why the yips were experienced (5%).
7	Questionnaires	Demographics, yips history and the golfer's subjective perception and definition of the yips.	Yips experienced during tournaments. 40 golfers experienced type-I symptoms (dystonia), 16 golfers experienced type-II (choking), and 14 golfers defined the yips discussing symptoms of both.
11	Questionnaires	CSAI-2R used before each trial (high and low-pressure): cognitive anxiety (CA), somatic anxiety (SA) and confidence (C).	Sig main effect for CA (p=<0.05). Sig difference between high and low-pressure for type-I and control (p=<0.05) but not type-II (p=>0.05).
19	Questionnaires	Trait and state anxiety and obsessive compulsiveness.	No differences between both groups for age, handicap, anxiety or competitive behaviour.
21	Interviews	Semi structured interviews. Analysed using thematic content analysis.	Higher order themes were (1) thoughts and feelings accompanying the yips-affected strokes and (2) focus of attention during yips-affected strokes
22	Questionnaires	Frosts Multidimensional Perfectionism Scale (Shortened-FMPS).	Sig correlations between all perfectionism subscales except organisation (ORG) and concern over mistakes (COM). FMPS subscales higher in yips-affected than non-affected (p<0.05)

			Successfully classified 89% of athletes with perfectionism as a whole (p=<0.01). Personal standards, ORG and COM mistakes all positive predictors of yips-affected (p=<0.05).
24	Questionnaires	Movement-specific reinvestment scale including conscious motor processing and movement motor processing subscales.	Neither the main scale nor the individual subscales could predict yips behaviour Nor were there any significant correlations between the reinvestment scales and yips behaviour.
25	Questionnaires	Yips demographics, trait anxiety, decision reinvestment, movement reinvestment, perfectionism, somatic complaints and stress coping strategies. Pre experiment. Anxiety thermometer and state anxiety were measured during performance over five conditions: low-pressure, high-pressure, using a sensory trick, context change condition and one-arm condition.	No main effect difference between any of the measures between the Y and NY groups prior to testing. During performance there was a significant main effect for group (control and pressure), but there was no interaction or main effect for time. There was a significant main effect for time and group (control, pressure, context change, one-arm sensory trick, one arm) but no interaction. Anxiety thermometer was significantly higher in both groups in pressure condition, one-arm putting and control conditions.

1= McDaniel et al. (1989); 2= Sachdev (1992); 4= Smith et al. (2000); 5= Bawden & Mayanrd, (2001); 7= Smith et al. (2003); 11= Stinear et al. (2006); 19= Adler et al. (2011); 21= Philippen & Lobinger, (2012); 22= Roberts et al. (2013); 24= Klampfl et al. (2013a); 25= Klampfl et al. (2013b).

2.3.3 Physiological Studies

2.3.3.1 Research design of Physiological studies.

The types of research designs included: case studies (*k*=7), experimental (*k*=7) and interventions (*k*=6). Botulinum toxin and other drugs were the two most investigated interventions (*k*=3). The physiological components of the yips have been investigated in golf (*k*=10), long distance running (*k*=2), tennis (*k*=1) and petanque (*k*=1).

2.3.3.2 Main Findings of Physiological studies

Quantitative studies. Physiological parameters were measured quantitatively in both experimental (*k*=7) and case study designs (*k*=7). The physiological parameters investigated included: electromyography (EMG; *k*=6), biomechanical examinations (*k*=4), magnetic resonance imaging (MRI; *k*=2), physical examinations (*k*=1), x-ray (*k*=1), electroencephalogram (EEG; *k*=1), heart rate (*k*=1) and grip force (*k*=1).

The most frequent physiological parameter tested was EMG (Adler, et al., 2005; Adler et al., 2011; Klampfl et al., 2013b, Lagueny et al., 2002; Smith et al., 2000; Stinear et al., 2006, Wu & Jankovic, 2006). EMG was investigated in golf (*k*= 4), long distance running (*k*= 1) and petanque (*k*=1). EMG was measured on golfers; elbow flexors and extensors (biceps and triceps: *k*= 4), wrist flexor and extensor muscle groups (forearms: *k*= 4), pectoralis major, deltoid and abductor digiti minimi (*k*= 1) were examined. Results indicated that yips-affected golfers had higher forearm, bicep and tricep muscle activation than non-affected golfers (Adler et al., 2005, 2011; Smith et al., 2000; Stinear et al., 2006). However, Klampfl et al. (2013b) found no difference between the groups. EMG was measured in long distance runners; the neck and knees were examined (Wu & Jankovic, 2006). There were no abnormalities for the EMG for the five runners used in the case studies. EMG was measured in petanque players: shoulder joint flexor and antagonistic muscles and shoulder joint extensor muscles were examined and no abnormality was reported (Lagueny et al., 2002). In summary, muscle activity in sport-specific limbs was high in some when yips-affected (See table 2.3).

Biomechanical examinations were conducted in four studies (Adler et al., 2011; Klampfl et al., 2013b; Marquardt, 2009; Rotherham et al., 2012). The parameters measured included: hand and club movement (setup, direction and distance; see table 2.3 for full measurements). Marquardt (2009) distinguished the severity of the yips based on the strength of oscillations (at least one excessive opening and closing action of the putter face) during a putting stroke into either heavy yips (strong oscillation) or mild yips (mild oscillations) groups. Marquardt found that compared to non-affected golfers, heavy-yips golfers rotated the putter face less at impact, lacked consistency regarding the angle of the putter face at impact, and experienced a significantly more inconsistent path arc. In contrast, mild yips-affected golfers had significantly longer backswing time to impact and increased duration of the backswing compared to non-affected golfers (see Table 2.3 for full explanation of these results). Adler et al. (2011) found yips-affected golfers experienced wrist flexor and extensor co-contraction when putting. Rotherham et al. (2012) found that emotional freedom techniques improved the biomechanical parameters, which reduced the symptoms suffered. Lastly Klampfl et al. (2013b) found that yips-affected golfers had significantly greater kinematic (face angle, face rotation, velocity and acceleration) inconsistencies between pressure trials (high and low-pressure) than golfers not affected by the yips. Interestingly Karlsen, Smith and Nilsson (2008) reported that the stroke has only a minor influence on direction consistency of golf putts among elite players.

MRI was used as an assessment in two case studies on long distance runners (Leveille & Clement, 2008; Wu & Jankovic, 2006). MRI was taken of the brain (*k*=2), neck, knee and spine (*k*=1). Results highlighted no irregularities. Leveille and Clement (2008) also used x-ray and bone scans of the affected limb (foot) and again the results indicated no abnormalities. Smith et al. (2000) measured heart rate and grip force when investigating putting between yips-affected and non-affected participants. They found that yips-affected golfers had a faster heart rate at point of contact with the ball and at post contact with the ball in all scenarios when compared to non-affected golfers. Furthermore, yips-affected golfers produced significantly greater grip force than those who were not affected throughout the whole putting stroke. In summary, EMG and biomechanical kinematics were strongly influenced by the yips, but it is unclear whether they play a differing role in those who suffer with type-I or type-II yips.

Intervention studies. Six studies have used interventions to help yips-affected athletes. The interventions included: drugs (*k*=3), botulinum toxin (*k*=3), acupuncture (*k*=1), sensory tricks (*k*=1) and Emotional Freedom Technique (EFT: *k*=1). All the interventions have been used as part of case studies.

Botulinum toxin was used in three studies with a total of five participants (Dhungana & Jankovic, 2013; Leveille & Clement, 2008; Wu & Jankovic, 2006) with varying results. Botulinum toxin proved ineffective in the longer term for all participants, although three participants did experience initial improvement, however, the dosage of Botulinum toxin was only reported for two of those (Dhungana & Jankovic, 2013). This may be due to the volume of botulinum toxin administered, which ranged from 50 units to 150 units, or the duration of the treatment, which was up to three years. These initial findings suggest that higher doses of botulinum toxin resulted in better initial improvements in symptoms but further improvements were not observed. Three participants used other drugs in combination with the botulinum toxin (Leveille & Clement, 2008; Wu & Jankovic, 2006).

Drugs were administered in three studies using a total of five participants (Leveille & Clement, 2008; Mayer, Topka, Boose, Horstmann, & Dickhuth, 1999; Wu & Jankovic, 2006) again with varying results. This may be due to the different forms of medication used along with the varying doses. The different forms of drugs included Sinemet, Carbamazepine, Levodopa and anticholinergic trihexyphenidyl-HCl (Artane). Sinemet was administered as an oral medication, which is used for Parkinson's disease and hereditary dystonia. Sinemet proved ineffective in yips symptoms on two case studies (Leveille & Clement, 2008). Carbamazepine, a medication for seizure and neuropathic pain, was taken orally and proved effective in reducing yips symptoms (Wu & Jankovic, 2006). Levodopa, used to treat Parkinson's disease and dopamine-responsive dystonia, was taken as an oral medication and proved effective as an intervention (Wu & Jankovic., 2006). Finally, Artane was taken as an oral medication within two case studies and proved effective, improving performance by 50-70% with minimal side-effects (Mayer et al., 1999; Wu & Jankovic, 2006).

Rosted (2005) administered acupuncture at sites GV20 (top of the head), EX-HN-1(top of head) and TE5 (wrist) on five occasions to a golfer who suffered with the yips. The golfer's physical and psychological symptoms (subjective anxiety) disappeared after the first session and the participant did not experience any relapse during the follow up sessions (telephone calls at six, 12 and 24 months). Dhungana and Jankovic (2013) reported that the use of sensory tricks with a golfer proved ineffective for dystonia of the wrist and head. The sensory trick involved pressing on his right cheek and the back of his neck to counteract the involuntary head movement. The condition did not improve and led to the golfer quitting the sport due to the pain associated with the dystonia symptoms suffered while executing shots. Additionally, Rotherham et al. (2012) found that four two-hour EFT sessions improved type-I symptoms of the yips for one golfer, which was sustained after a six month follow up.

Table 2.3:

Main physiological findings (Y=yips-affected, NY= non-affected).

Study No	Study design	Data collection	Main Findings
3	Case studies*	Physical examination (PE). Video analysis without racquet and ball, the movements were fluid and unimpaired in simulation of backhand, forehand and serve left to right. Anticholinergic Trihexyphenidyl-HCl (Artane) 12 $mg \cdot d^{-1}$ was initiated. 5mg to 2x5 mg artane tet/day for three years was administered	PE normal. There was a discrete fine-motor control issue in affected limb and dysdiadochokinesia, with tremors in fingers on both sides. Athletic performance capacity improved by 50%-70% over baseline.
4	Experimental	EMG- elbow flexors and extensors (biceps and triceps) and the wrist flexor and extensor muscle groups. Heart rate (three electrode surface telemetry system), grip force using strain gauges. Performance of three different distances lies and breaks (varieties in difficulty).	Yips-affected had a faster mean HR at point of contact with ball and post contact with ball. Yips golfers produced significantly greater grip force (p=0.04). Greater EMG activation apparent in those yips-affected golfers especially in forearm muscles.
6	Case studies	Physical tests were normal, video analysis showed freezing of shoulder flexion from the very first throw. EMG taken at shoulder joints flexor, antagonistic shoulder joint extensors when performing 1) gesture nothing in hand, 2) throwing at target with boule from distance, 3) throwing at target from the same distance with a tennis ball, 4) at target with eyes closed.	Results showed no abnormal contractions; during freezing burst were smaller amplitude and shorter duration for condition 1, but not conditions 2-4.
8	Case studies*	Five acupuncture sessions. Acupuncture administered and telephone follow up to check symptoms at, 6, 12 and 24 months.	Yips symptoms disappeared after one session, and no relapse at follow ups.
9	Experimental	EMG on 10 locations, placed bilaterally on the pectoralis major, deltoid, biceps, triceps, wrist flexors, pronator teres, flexor pollicis longis, wrist extensors, abductor pollicis brevis and abductor digiti minimi before putting task.	At 200 milliseconds before, 50% of yips-affected experienced co-contractions of the wrist flexors, none of non-affected experienced this (p=0.06). No other difference between any other locations.
10	Case studies*	MRI and EMG of brain, spine, neck and knee were all normal. Botox and drugs were administered including carbamazepine, Levodopa and Trihexyphenidyl (Artane).	MRI and EMG of brain, spine, neck and knee were all normal Interventions: Botox helped when used by two participants. Drugs proved helpful.
11	Experimental	Task 1: EMG- taken from flexor carpi radialis, extensor carpi radialis and biceps brachii during putting task. Task 2: EMG—first dorsal interosseous (FDI) of dominant hand during a task testing their ability to inhibit a prepared action.	Significant interaction between muscle and group (p=<0.05), yips groups had higher activity in muscle groups. Type-I had higher muscle activity than control (p=<0.05) for putting task. During task 2, significant main effects of group on mean error, absolute error and variable error. Type-I had higher muscle activity than control (p=<0.05)

14	Case studies*	Foot x-rays, bone scans, MRI. Intervention included Botox injections (100 units over 8 months/ 50, 75, 100 units over 6 months) and Sinemet (month dose, 25-100 half tablet twice daily).	All assessments were unremarkable. Sinemet unsuccessful, Botox showed mild improvements in one participant in rough/hard terrain but successful in rough terrain.
17	Experimental	During seven putts from four metres, SAM putt lab technology measured the following: setup: face angle at aim; direction: path direction at impact, face angle at impact, rate of face rotation at impact, arc of path at impact, rotation relative to arc inside +/- 10mm. Distance: Impact speed, duration of backspin, time to impact in downswing.	Significant main effect for rate of rotation (*p*=<0.05), SD face angle at impact (*p*=<0.05), SD rate of rotation (*p*=<0.001) and SD arc of the path at impact (*p*=<0.001). Heavy-yips-affected significantly rotate the club less through impact have more inconsistent face angle at impact and more inconsistent path arc than non-affected. Significant main effect for backswing time and SD (*p*=<0.05), and SD for impact time in downswing (*p*=<0.001). Mild-yips golfers showed significantly increased backswing to impact, and significantly increased duration of the backswing than non-affected.
19	Experimental	EMG taken from biceps, triceps wrist extensor and flexors. Electronic photocell of stroke and impact. Hand movement was measured by 18 sensors embedded in a flexible glove. Peak wrist displacement and velocity was measured from 1 sec before to 1 sec after contact with ball.	When groups based on visual yips, yips cases had more angular movement in wrist pronation/supination (*p*=<.001) and a trend for wrist flexor/extensor co-contraction (*p*=.08).
20	Case studies*	SAM putt lab measured movement paths, face angles, path direction, impact spot, velocity, acceleration, before and after using Emotional Freedom Techniques (EFT) of type-I golfer.	Symptoms improved/diminished as EFT occurred and maintained at 6 month baseline.
23	Case studies*	Use of sensory tricks and Botox Injection to pronator teres and pronator quadratus muscles.	Sensory tricks were unsuccessful with the client quitting sport due to pain and soreness but later returned. Botox treatment was successful.
24	Experimental	Use of both reinvestment focus and external focus on movement variability.	Movement variability was not significantly different between trials.
25	Experimental	Heart rate was measured pre and during putting. EMG of flexor carpi radialis (FCR), extensor carpi radialis (ECR) and biceps brachii (BB) were measured pre, during and post putting.	Heart rate was higher for both groups in pressure conditions and lower in one arm putting and control conditions. A significant main effect for group was found for muscle activity. Right arm ECR higher in one arm and context change compared to control. Co-contraction index in right arm lower in one arm condition than control condition. A significant main effect for group and time

	Kinematics (SDs of rotation, face angle velocity and acceleration at impact) during putting performance over five conditions: Low-pressure, high-pressure, using a sensory trick, context change condition and one-arm condition.	and an interaction for kinematics were found. Y group had higher values for all variables across all conditions than NY group.

*denotes an intervention was used in the study; 3= Mayer et al. (1999); 4= Smith et al. (2000); 6= Lagueny et al. (2002); 8= Rosted (2005); 9= Adler et al. (2005); 10= Wu & Jankovic, (2006); 11= Stinear et al. (2006); 14= Leveille & Clement, (2008); 17= Marquardt, (2009); 19= Adler et al. (2011); 20= Rotherham et al. (2013); 23= Dhungana & Jankovic, (2013); 24= Klampfl et al. (2013a); 25= Klampfl et al. (2013b).

2.3.4 Neurological Studies

2.3.4.1 Research design of Neurological studies

The types of research designs included: case studies (*k*=7), experimental (*k*=4) and interventions (*k*=3). Three interventions included drugs (*k*=1), botulinum toxin (*k*=1) and reduction of practice load (*k*=1). The neurological components of the yips have been tested in golf (*k*=4), long distance running (*k*=2), tennis (*k*=1), pistol shooting (*k*=1), petanque (*k*=1) and table tennis (*k*=1).

2.3.4.2 Main Findings of Neurological studies

Quantitative studies. Neurological parameters measured quantitatively (see table 2.4) included; neurological testing (*k*=6), nerve conduction velocity (NCV; *k*=2), trail making tests (A and B) (*k*=1), symbol digit modalities test (*k*=1), finger tapping test (*k*=1), grip strength (*k*=1), DYT1 gene mutation (*k*=1), CT scan (*k*=1), electroencephalography (EEG; *k*=1), Fahn's Arm Disability Scale (*k*=1) and a mini examination (*k*=1). Three studies employed an experimental design to investigate neurological aspects of the yips (Adler et al., 2005; Klampfl et al., 2013a, 2013b; Sachdev, 1992) with the remaining studies focusing on case studies (Lagueny et al., 2002; Le Floch et al., 2010; Leveille & Clement, 2008; Mayer et al., 1999; Ringman, 2007; Stiburana, 2008; Wu & Jankovic, 2006).

Neurological testing is the most popular measurement of neurological functioning although, it was just used in a case study format (Lagueny et al., 2002; Le Floch et al., 2010; Leveille & Clement, 2008; Mayer et al., 1999; Stiburana, 2008; Wu & Jankovic, 2006). These tests identified abnormalities in the sport specific affected limb. NCV (Le Floch et al., 2010; Wu & Jankovic, 2006), DYT1 gene mutation testing (Wu & Jankovic, 2006), CT scan (Leveille & Clement, 2008), MRI (Wu & Jankovic, 2006) and mini mental state examination (set of tests and questions; Ringman, 2007) were all used as forms of measurement of neurological parameters within case studies, highlighting no abnormalities except for one participant who had similar scores on the mini mental state examination to those fitting the criteria for Alzheimer's disease.

Adler et al. (2005) measured EEG in yips-affected and non-affected golfers while putting and found that the yips-affected group had a significantly smaller somatosensory evoked potential at one electrode (involved in tactile and motor processing) than those not affected. However, Leveille and Clement (2008) found no abnormalities in yips-affected long distance runners.

Klampfl et al. (2013b) used Fahn's Arm Dystonia Scale (Burke et al., 1985) to see if there was an instance of focal-dystonia. They found no difference between those affected and non-affected. Sachdev (1992) compared a number of neurological parameters between yips-affected and non-affected golfers including trail making tests, a symbol digit modalities test, grip strength (hand grip dynamometer) and a finger tapping test. No significant differences between those who were yips-affected and those who were not affected were found. In summary, a number of neurological parameters have been inconclusive regarding the role played in the yips.

Intervention studies. There were three studies (Leveille & Clement, 2008; Mayer et al., 1999; Wu & Jankovic, 2006) that included a combination of physiological and neurological components with an intervention. These interventions included drugs (Ringman, 2007), botulinum toxin (Stiburana, 2008) and reduction of practice load (Le Floch et al., 2010), which were completed on single case study participants. The drugs administered to a male golfer included Donepezil and Memantine; an oral medication for Alzheimer's disease and proved effective in reducing the symptoms of the yips (Ringman, 2007). Stiburana (2008) administered 100 units of type A botulinum toxin into four affected muscles although the effectiveness of the intervention was not reported. The final intervention reported that reduced practice load and excluding repetitive movements was ineffective as an intervention (Le Floch et al., 2010). In summary, the efficacy of these interventions remains inconclusive.

Table 2.4:

Main neurological findings

Study No	Study design	Data collection	Main Findings
2	Experimental	Trial Making Tests A and B, Symbol Digit Modalities Test (SDMT), Finger Tapping Test (FTT) and hand grip strength.	No significant differences
3	Case studies	Neurological testing and questions on psychological state.	Neurological testing identified that there was a discrete fine motor control issue in left hand, mild tremor in the fingers on both sides and the left hand, dysdiadochokinesia left, with otherwise no neurological abnormalities.
6	Case studies	Neurological testing and performance measured at four conditions (see table 2.5 for details).	Neurological tests were normal, video analysis showed freezing of shoulder flexion from the very first throw.
9	Experimental	Somatosensory evoked potentials (SEP) were recorded at N20L, N20R, P25L, P25R, FzL, FzR, CzL and CzR at 2.2Hz using an average ear reference.	SEP data revealed significant (CzL) and trends (P25L, FzL) to higher amplitude N30 waves in the yips-affected group compared to unaffected group.
10	Case studies	Neurological examination including Nerve Conduction Velocity (NCV) and test if there was mutation of gene DYT1.	Neurological examination normal apart from two participants who had some slight issues with affected limbs. NCV was normal and no mutation of gene DYT1.
13	Case studies*	Mini mental state examination was administered. Followed by an intervention of drugs (Doneepezil and Memantine).	Scored 14/30 in MMSE therefore fitting criteria for probable Alzheimer's disease (AD). Intervention reduced yips symptoms.
14	Case studies	Neurological examination including EEG, CT scan, rheumatoid factor, uric acid levels, lupus antibodies and Morton's neuroma.	Neurological tests all normal apart from affected limb having visual dystonia symptoms.
15	Case studies*	Clinical and neurological examination. Followed by an intervention of Botox.	All unremarkable except mild weakness of his right abductor pollicis brevis and a positive tinels sign. Suffers with carpel tunnel syndrome. Effectiveness of intervention not reported.
18	Case studies*	Neurological examination including cervical MRI, NCV. Followed by one participant reducing practise load and excluding repetitive movements as an intervention.	All normal. No family history of dystonia, Parkinson's disease, tremor, tics or scoliosis. Intervention not effective.
25	Experimental	Neurological questions and the Fahns arm Dystonia Disability Scale	No significant differences between groups. No one identified that they had to cope with a neurological disorder. One member in each group had a family member having hand tremors.

*denotes an intervention was used in the study; 2= Sachdev (1992); 3= Mayer et al. (1999); 6= Lagueny et al. (2002); 9= Adler et al. (2005); 10= Wu & Jankovic, 2006); 13= Ringman (2007); 14= Leveille & Clement, (2008); 15= Stiburana (2008); 18= Le Floch et al. (2010); 25= Klampfl et al. (2013b).

2.3.5 Performance Studies

2.3.5.1 Research design of Performance studies

The types of research designs included: experimental (*k*=6), case studies (*k*=3) and interventions (*k*=3). Solution-focused guided imagery (SFGI) was the most investigated intervention (*k*=3). All the yips performance research has been conducted in golf (*k*=9).

2.3.5.1 Main Findings of Performance studies

Quantitative studies. Six experimental studies (Adler et al. 2005, 2011; Klampfl et al., 2013a, 2013b; Smith et al. 2000; Stinear et al. 2006; See table 2.5) compared the number of successful putts made between yips-affected and non-affected golfers with varying results. This may be due to the varying number of putts measured (10-75 putts), the different distances (6-8 feet) and different difficulties (uphill, downhill etc; see Table 5). Adler et al. (2005), Klampfl et al. (2013b) and Smith et al. (2000) identified that yips-affected golfers performed worse than non-affected golfers in putting accuracy. Klampfl et al. (2013b) and Stinear et al. (2006) were the only studies to induce pressure and both found no significant difference between the yips-affected and non-affected groups in putts holed. However, Klampfl et al. (2013b) and Adler et al. (2011) found that for shots that were missed, yips-affected golfers appeared to miss by a greater degree than non-affected golfers. In summary, only Smith et al. (2000) reported a significant difference in putts holed between yips-affected and non-affected golfers. A limitation of these studies was that no pressure was induced; however, when pressure was induced accuracy was most impaired in putts missed by yips-affected golfers (Klampfl et al., 2013b; Stinear et al., 2006). Finally, the impact on performance in other sports is currently unknown due to the exclusive focus on golf.

Intervention studies. Bell and Thompson (2007), Bell, Skinner and Fisher (2009) and Rotherham et al. (2012) are the only researchers, to date, to investigate the effectiveness of psychological interventions on the yips using SFGI and EFT. The performance parameters tested included the number of visual yips (visible physical symptoms of the yips) and putting accuracy per round of golf. However, this research is in its infancy and all three studies have reported case studies.

Bell and Thompson (2007) found that five sessions of SFGI lasting 20-30 minutes had a positive effect on one golfer’s performance over three testing periods including baseline, an intervention period and a maintenance period (60 days) using the performance parameters. Bell et al. (2009) attempted to replicate Bell and Thompson’s (2007) study and found four to five 20-minutes SFGI sessions to be effective for improving the participant’s visual yips symptoms and putting accuracy (*n*=3). However, the maintenance period occurred after 21 days, as opposed to 60 days (Bell & Thompson, (2007). This may help explain why the participant in Bell and Thompson (2007) study experienced two visual yips after 60 days whereas no participants experienced any after 21 days (Bell et al., 2009).

Rotherham et al. (2012) followed a similar design to Bell and colleagues (2007, 2009) including baseline testing sessions, an intervention testing period of four weeks and a six month follow up testing period. They found that four two-hour sessions (seven days before data collection point) of EFT had a positive impact on putting accuracy and the number of visual yips (physical jerk or tremor in movement) during a round of golf. Symptoms associated with a visual yip subsided by the fourth session of EFT and was maintained at a six month follow up. Therefore, Bell and colleagues (2007, 2009) and Rotherham et al. (2012) provide initial evidence that SFGI and EFT could be effective interventions for yips symptoms and further research is warranted.

Table 2.5:

Main performance findings (Y=yips-affected, NY= Non-affected).

Study No	Study design	Data collection	Main Findings
4	Experimental	Number of putts, 10 putts from four distances.	NY successfully putted more consecutively (9/10 and 5/10) than Y group.
9	Experimental	Number of putts.	There was a trend that Y golfers made fewer putts and have a greater degree in missing the putts.
11	Experimental	Number of putts under high (monetary rewards) and low-pressure situations.	There was no significant effect of condition on putting accuracy. There was a main effect of monetary reward on putting accuracy, between control and type-II (p=<0.05) but not type-I (p=>0.05).
12	Case studies*	Performance was measured by putting success rate (average) per round and the number of visual yips per round. An intervention of five 20-30 minute sessions of solution-focused guided imagery.	Putting success rate and visual yips improved from baseline to intervention. At maintenance phase (60 days after) two visual yips were experienced.
16	Case studies*	Performance was measured by putting success rate (average) per round and the number of visual yips per round. An intervention of five 20-30 minute sessions of solution-focused guided imagery.	Putting success rate and visual yips improved from baseline to intervention. At maintenance phase (21 days after) no visual yips were experienced.
19	Experimental	Number of putts.	There was no between group differences on the number of putts made.
20	Case studies*	Performance was measured by putting success rate (average) per round and the number of visual yips per round. An intervention of four sessions of two hour sessions (seven days before each data collection point) of Emotional Freedom Technique.	Putting success rate improved from baseline on all putts (apart from TP 3 from 6 feet) and maintained at six-month follow up. Number of yips subsided by end of session 4 (apart from data collection point 2 from 2-4 feet).
24	Experimental	Performance was measured by putting 20 one metre putts, during a skill focus and an external focus environment	No significant difference between trials on putting performance
25	Experimental	Performance was measured by 15 1.5 metre putts. Outcome and distance from hole of missed putts were recorded during five different trials (both arms, under pressure, with just dominant arm, with a uni-hockey racket and with latex gloves).	No main effect for group but a significant main effect for condition and an interaction effect for outcome and distance of missed putts from hole. The Y group holed significantly fewer putts compared to the NY group in the one-arm condition and missed at a larger distance too.

*denotes an intervention was used in the study; 4= Smith et al. (2000); 9= Adler et al. (2005); 11= Stinear et al. (2006); 12= Bell et al. (2007); 16= Bell et al. (2009); 19= Adler et al. (2011); 20= Rotherham et al. (2013); 24= Klampfl et al. (2013a); 25= Klampfl et al. (2013b).

2.4 Discussion

Since McDaniel et al.'s (1989) research on the yips, there have been a number of qualitative, quantitative and case studies published in the area. Therefore, the aim of the current paper was to provide the first systematic review of all the literature to date (December 2013) on the yips and other movement disorders in sport. Twenty-five studies were identified which focused on the yips in sport, encompassing studies that specifically investigated athletes who suffered with dystonia. Most studies have focused on the yips in golf following McDaniel et al.'s (1989) first investigation. Although there is a burgeoning literature on dystonia (Jinnah et al., 2013; Konczak & Abbruzzese, 2013) and choking (Hill et al., 2010), the research base on the yips remains small.

2.4.1 Main findings

The primary aim of this article was to systematically review the four components of the yips. The findings revealed that each component plays a distinct role in the development and/or subsequent experience of the yips. Although there has been an increase in the amount of yips literature (e.g., Philippen & Lobinger, 2012; Roberts et al., 2013; Rotherham et al., 2012), there is still a lack of consensus with regard to the role each component plays in determining the prevalence, severity and duration of these symptoms. However, there is sufficient evidence to provide some indication about the influence of anxiety and EMG on the yips and this is discussed below.

It is clear from qualitative reports on the yips (Bawden & Maynard, 2001; Philippen & Lobinger, 2012) that anxiety is associated with experiencing the yips, and is thus the most frequently measured psychological characteristic (k=4); three studies focussed on state anxiety and three on trait anxiety. Findings revealed that there were no differences between yips-affected and non-affected golfers (Adler et al., 2011; Klampfl et al., 2013b; Sachdev, 1992; Stinear et al., 2006). This contrasts with the elevated trait anxiety found in musicians with focal-dystonia (e.g., Enders et al., 2011), which may be due to larger sample sizes and a more discrete definition of musician's dystonia. Stinear et al. (2006) reported a main effect of pressure for cognitive anxiety; t-tests revealed cognitive anxiety increased from low to high-pressure in both the control and type-I golfers, but not in type-II golfers. This may suggest that psychological correlates of type-II athletes are unchanged in pressure situations, which is unexpected. Caution is warranted when considering both these results, which were derived from studies that may only be powered to detect large effect sizes (n=24-50), and the corpus of studies, which is small. Stinear et al.'s findings focus on the intensity of anxiety, but interpretation of anxiety may be a more important predictor of performance (Hanton et al., 2004). Furthermore, the CSAI-2 has been reported to have less than optimal validity and reliability (Cox, Martens, & Russell, 2003). The CSAI-2R has better psychometric properties and, if coupled with Jones and Swain (1992) direction scale, would provide a good measure of anxiety and how it is interpreted.

Related research has implicated obsessional thoughts and perseverative cognitions as factors that facilitate the onset of focal-dystonia in musicians (Jabusch & Altenmuller, 2004; Lehn et al., 2014). In golf, McDaniels et al. (1989) found that yips-affected golfers experienced greater obsessional thoughts than those non-affected, but two studies found no difference (Adler et al., 2011; Sachdev, 1992). However, both studies used measures of obsessional thoughts that have questionable validity and reliability (Roberts et al., 2013), and much smaller sample sizes. Thus, the studies may have had insufficient power to detect effects; consequently, it is recommended that future studies should use appropriate obsessional thoughts measures and be adequately powered to detect effects. Moreover, the focus of those obsessional thoughts may be important. Bawden and Maynard (2001) reported that yips-affected cricketers described feeling self-conscious and as though everyone was watching them. In contrast, Philippen and Lobinger (2012) described how yips-affected golfers focused on possible future mistakes and technical skill. This suggests that in some cases, yips-affected athletes may focus externally on the crowd or internally on possible mistakes. Thus, obsessional and compulsive thinking may be less important than intrusive and self-conscious thinking (Klampfl et al., 2013 a,b). Perfectionism has been associated with the yips (Roberts et al. 2013) and musician's dystonia (Altenmuller & Jabusch, 2009), which is not surprising given its relationship with obsessional and intrusive thoughts (Flett, Madorsky, Hewitt, & Heisel, 2002). However, Roberts et al. (2013) caution that their mean scores for perfectionism were actually very low compared with scores reported in previous mainstream psychology perfectionism studies (e.g., Rice & Mirzadeh, 2000; Sapieja et al., 2011).

Taken together, these findings suggest that anxiety plays a role in the yips and there is evidence to suggest it manifests in heightened intrusive thoughts, self-consciousness and perfectionistic tendencies in line with the contrast avoidance model of anxiety (Newman & Llera, 2011). This model suggests that individuals who experience extreme anxiety are hypersensitive to change in emotional states. It is reported that these individuals experience worry or intrusive thoughts, which negatively influence their emotional state towards upcoming future events. Thus, this model may help us understand the emotions and cognitions of athletes with the yips. However, their role in the yips is unclear due to the cross-sectional design of the studies that precludes conclusions about causality, and their influence on the experience of type-I or type-II athletes specifically.

It is no surprise that EMG was the most popular form of physiological measurement within the yips research (*k*=7), based on the symptoms of focal-dystonia (jerks, tremors). The findings indicated that yips-affected golfers had higher muscle activation in affected limbs than non-affected golfers in experimental studies (*k*=5). Stinear et al. (2006) reported that both type-I and type-II groups experienced greater muscle activity than the control group in both high and low-pressure environments. The greatest muscle activity was experienced during the high-pressure condition for all groups, although in the low-pressure condition the type-I group experienced higher muscle activity than the control group. Therefore, type-I golfers experience heightened muscle activation in both high and low-pressure environments, whereas type-II golfers' muscle activation is only influenced in high-pressure environments.

Adler et al. (2011) and Klampfl et al. (2013b) found that this increase in EMG impacted a number of kinematic parameters, such as face angle at contact with the ball, wrist movement and irregularities in path arc which in turn impair performance. Interestingly, Smith et al. (2000) found that yips-affected golfers had a significantly higher grip force than their non-affected counterparts. This may be an important variable to measure in other sports too, given that those who suffer dartitis report not being able to release the dart (Honeyball, 2004). The impact of grip force may relate to a disorder of sensory feedback by neurological processes (Sanger &Merzenich, 2000).

Neurological testing within the research has focused on dystonia symptoms through case studies with no abnormalities reported. The impact of the yips on performance has focussed exclusively on golfers in both experimental (*k*=6) and case studies (*k*=3). These findings suggest that when yips-affected golfers missed, they missed by a greater degree than their non-affected counterparts (Adler et al., 2005; Klampfl et al., 2013b; Smith et al., 2000; Stinear et al., 2006), but only Smith et al. (2000) found that the yips influenced the number of putts holed. Also, only two studies compared performance of yips-affected and non-affected golfers in both low and high-pressure environments (Klampfl et al., 2013b; Stinear et al., 2006). Klampfl et al. (2013b) reported that yips-affected golfers holed significantly fewer putts when using just their dominant arm than those non-affected, but yips type was not reported. The remaining four experimental studies failed to report the pressure of the environment under which trials were performed, limiting the findings as symptoms are often exacerbated under high-pressure environments (Bawden & Maynard, 2001; McDaniels et al., 1989; Smith et al., 2000, 2003).

Since the development of Smith et al.'s model (2003), only two studies (Rotherham et al., 2012; Stinear et al., 2006) have specifically identified participants as belonging to type-I or type-II groups. It is proposed that failing to recognise the differences in the yips groups could have implications on our understanding of the associated predictors and mechanisms. Qualitative accounts of the yips suggest that the symptoms are exacerbated in pressure environments (Bawden &Maynard, 2001; Philippen & Lobinger, 2012). Moreover, Stinear et al. (2006), in the only published study to differentiate between yips types experimentally, reported that type-I and type-II golfer's experienced different levels of anxiety and EMG values between high and low-pressure environments, with the type-II group exhibiting greater changes in cognitive anxiety and normal performance.

It appears that performance implications are different based on the type of yips symptoms experienced; however, only one experimental study to date (Stinear et al., 2006) has differentiated golfers into type-I or type-II groups. Stinear et al. (2006) found that type-I golfers experienced very similar performance decrements associated with physical symptoms to those who experienced musician's dystonia (Ruiz, Strubing, Jabusch, & Altenmuller, 2011). However, Altenmuller and Jabusch (2009) suggest professional pressure as a facilitating factor for the onset of musician's dystonia; in musicians with dystonia symptoms, psychological factors may play a role. Similarly, type-II athletes may experience a greater negative interpretation of pressure in general performances or feel greater professional pressure in both low and high-pressure environments, but only physical symptoms are experienced in high-pressure environments (Stinear et al., 2006). An understanding of the role played by psychological and physical factors in the yips has been hindered by the failure of many studies to distinguish groups based on symptoms. This may reflect issues regarding the definition and model used within the literature to date.

2.4.2 Definition and aetiology

The second aim of the review was to clarify and expand on a definition of the yips across sports, so that it could be used effectively and consistently by practitioners and researchers. Smith et al. (2000) provide the most inclusive definition as it incorporates all three key components of the yips: "*a psycho-neuromuscular impediment affecting the execution of the putting stroke in golf"* (p.426). This definition is the most popular within the literature when explaining the yips, although it is specific to golf. Therefore, we recommend that Smith et al.'s (2000) definition is modified to be more inclusive of other sports and therefore propose that the yips in sport be defined as "*a psycho-neuromuscular impediment affecting the execution of fine motor skills during sporting performance*".

Smith et al.'s (2000) definition was refined by Smith et al. (2003) as a continuum, to classify yips-affected athletes based on their reported symptoms using focal-dystonia (type-I) and choking (type-II) as anchors. Smith et al. (2003) recruited 72 yips-affected golfers to provide their subjective definition of their yips symptoms. Of those golfers, 40 reported physical symptoms only (dystonia type-I) and 16 reported psychological symptoms only (choking type-II). However, 14 golfers described both psychological and physical symptoms associated with their yips experience and were not categorised. Although Smith et al. report that athletes may experience both symptoms they do not explain how these athletes should be classified. This lack of clarity about this group of athletes may explain why this model has not been adopted by many researchers (cf. Stinear et al., 2006; Rotherham et al., 2012).

Given the importance of symptomology as described above, the number of athletes uncategorised in a study by Smith et al. (2000) is troubling and suggests that categorising athletes is not as simple as being exclusively type-I or type-II. Qualitative accounts of cricketers (Bawden & Maynard, 2001) reveal that the athletes experienced both physical and psychological symptoms, although the severity of those symptoms is not reported. It is important that those who experience both types are categorised more effectively to aid with clarity and understanding for future researchers.

Thus, we propose that Smith et al.'s continuum model be further refined to a two-dimensional continuum model, with the inclusion of a type-III criterion incorporating those who experience symptoms of both focal-dystonia and psychological symptoms (see Figure 2.2 and Table 2.6). The updated model includes athletes who predominately experience physical symptoms of the yips as type-I (focal-dystonia); those who predominately experience psychological symptoms of the yips as type-II (choking); and those who experience both psychological and physical symptoms as type-III (focal-dystonia and choking).

Our model suggests that individuals can experience different severities of both symptoms (focal-dystonia and choking). For example, an athlete can experience intense psychological symptoms and minor focal-dystonia symptoms or vice versa. This model will allow greater comparison between the types of yips-affected athletes experimentally.

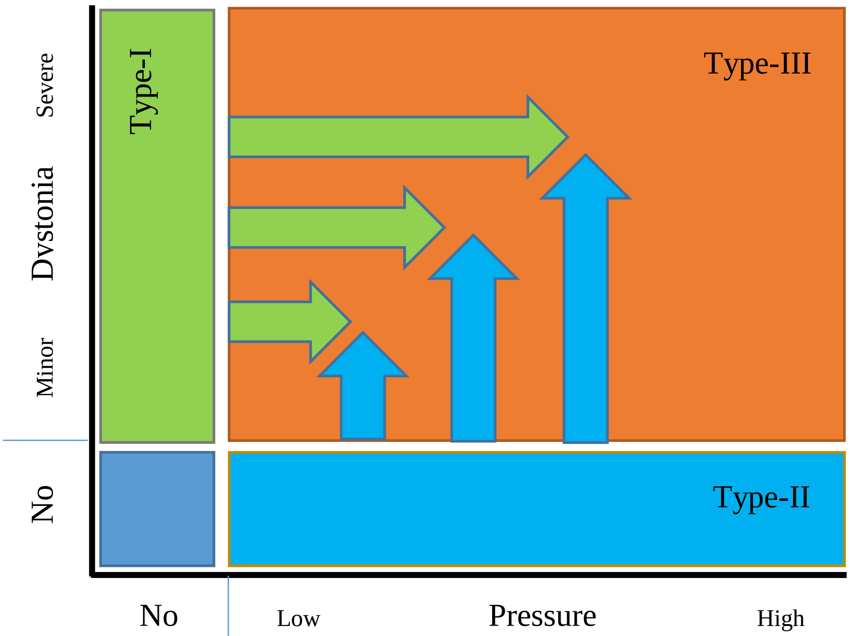

Figure 2-2: *The updated model of the yips classification*

Table 2.6:

Definitions of yips classifications

Type:	Definition
I	Individuals who experience physical symptoms (focal-dystonia)
II	Individuals who experience psychological symptoms (choking)
III	Individuals who experience both physical and psychological symptoms (focal-dystonia and choking)

Despite recent research, the aetiology of the yips is still unclear. Some research suggests that focal-dystonia occurs first and symptoms are worsened by anxiety (Sachdev, 1992; Smith et al., 2003, 2000), whereas other research suggests that psychological issues may facilitate the onset of focal-dystonia (Enders et al., 2011). Again, a major limitation of these studies is their cross-sectional nature. Furthermore, most previous studies have used only one methodological approach, e.g., physiological or psychological. We support Lobinger, Klampfl, and Altenmuller's (2014) contention that neurological, physiological, psychological and kinematic data should be combined to diagnose the yips, as they afford assessment of automatic (type-I) emotional and cognitive (type-II) control systems. The few qualitative accounts reviewed provide little additional insight, although Bawden and Maynard (2001) reported that cricketers were under heightened pressure when they first experienced the yips. Without longitudinal studies, we cannot confidently identify the exact aetiology of the yips in sport. Therefore, we recommend future longitudinal research makes use of our model, along with a range of methods (Lobinger, Klampfl, & Altenmuller, 2014), to provide greater insight into the aetiology of the yips in sport.

2.4.3 Applied Implications

Our model will allow practitioners to effectively propose interventions based on the yips-group. For example, pharmacological interventions such as those administered by Wu and Jankovic (2006) and Ringman (2007) are unlikely to be effective for those who suffer with type-II yips symptoms only, whereas, psychological interventions such as SFGI (Bell & Thompson, 2007) may not be as beneficial for those suffering with type-I yips symptoms (see Lobinger, Klampfl, & Altenmuller, 2014). Therefore, this model will provide practitioners with greater clarity of the types of interventions that will be more effective for their athletes based on symptoms experienced.

The high prevalence rates of the yips suggest that a greater understanding of aetiology and treatment of the yips is important. Altenmuller (2003) reported that 1% of musicians were affected, and Smith et al. (2000) and McDaniels et al. (1989) reported between 28% and 54% of golfers with a low handicap experiencing the yips. A possible explanation for the differing prevalence rates may be the competitive nature of sport. Both musicians and athletes have to be able to perform their skills efficiently in front of audiences. However, athletes also have to outperform other athletes to be deemed successful (i.e., winning a competition). Therefore, this may induce greater pressure especially in competitions. This may account for symptoms being exacerbated in pressure environments (Bawden & Maynard, 2001, Philippen & Lobinger, 2012). Another possible explanation may be associated with the consequence of a disruption in performance. The sports where yips are most prevalent (e.g., golf) are usually individual sports and therefore a mistake can have a direct impact on success. For example, a missed note by a musician may be covered up by the next couple of notes or drowned out by the rest of the orchestra. However, a disruption in sporting performance such as a putt in golf can leave the individual in a worse position than where they started (missed putt ending up 10 feet further from the pin). Therefore, this added pressure could also facilitate the onset of yips type-I symptoms.

2.4.4 Future studies

Further researchers exploring the yips is needed to provide greater understanding of the predictors and mechanisms associated and the impact this condition may have on athletes. Based on the findings in this review, it is recommended that an interdisciplinary approach is utilised to ensure that both psychological and neuro-physiological components are considered together. This will allow athletes to be categorised as type-I (dystonia), type-II (choking) or type-III (dystonia and choking) more effectively and consistently using the definition and model proposed in the current systematic review. This approach will also allow for testing potential mechanisms and associated predictors. To ensure this happens effectively a combination of survey, observation, behavioural and kinematics measures is advocated. Moreover, studies should not be limited to cross sectional designs and we implore the use of longitudinal and experimental methods.

Case studies may provide further insight into the yips: case studies being the most popular research approach reviewed (*k*=12). Barker et al. (2013) argued that case studies could be beneficial for demonstrating the effectiveness of consultancy and may help determine the mechanisms related to the effectiveness of an intervention in applied settings. For example, Rotherham et al. (2012) found that the EFT was an effective intervention for a yips-affected golfer whose performance improved alongside biomechanical parameters. Indeed, all the intervention studies to date have been in a case study format, ranging from botulinum toxin to other drugs and psychological strategies (e.g., Leveille & Clement, 2008; Mayer et al., 1999; Rotherham et al., 2012). Therefore, case studies might be utilised for future research to investigate the yips in other sports, such as target-panic in archery, or allow for initial testing of interventions by applied practitioners.

Furthermore, there is a lack of research in sports other than golf. Future research is needed in other sports where athletes have suffered with yips-like symptoms, such as “target-panic” in archery. This will permit models such as the one presented to be validated across a range of sports. Furthermore, similarities and differences in the experiences of those who suffer with the yips should be explored. This should afford greater underpinning for the development, testing and evaluation of interventions that will help with the prevention and treatment of yips-like symptoms

2.4.5 Limitations

Over the last few decades the rise in systematic reviews means that they have overtaken the traditional literature reviews, which are frequently descriptive and are unable to make sense of the many and disparate studies reviewed (Goodgear et al., 2007; Noblit & Hare, 1988). This systematic review has attempted to integrate large quantities of information from both quantitative and qualitative studies into one document, following specific guidelines to ensure validity (PRISMA; Moher et al., 2009); these are recognised strengths of systematic reviews (Mulrow, 1994). However, there are a number of limitations to this review. Although an extensive literature search was conducted it is possible that there is literature available that is not in the English language (e.g., Tanaka et al., 2005, which was excluded for being in Japanese). Furthermore, the search also excluded unpublished literature, which may include Masters and Doctoral dissertations and other grey literature (Stern & Simes, 1997). These omissions may bias this review in favour of studies with significant differences and relationships and overplay the most interesting (to researchers and journal editors) findings, for example florid and pithy quotes.

2.4.6 Conclusion

In conclusion, published research on the yips in sport has experienced a growth in popularity over the last 10 years (Adler et al., 2011; Bell & Thompson 2007, Klampfl et al. 2013a, 2013b; Philippen & Lobinger, 2012; Roberts et al., 2013) and, as such, has advanced our understanding of the yips in sport. This article provides the first systematic review of all literature published on the yips and movement disorders in sport up until the end of 2013. The primary aim of this article was to systematically review the psychological, neurological and physiological parameters of the yips along with the impact the yips have on performance. This article has addressed what has been established about each of the parameters; providing a collective overview of what is known and where the literature needs to go, in order to provide greater clarity and depth of understanding of this condition.

A second aim of the review was to add clarity to a definition of the yips across sports. There have been inconsistencies in the definition used within the literature where it is described as being either a physical disorder or a psycho-neuromuscular disorder (McDaniels et al, 1989; Smith et al., 2000). Therefore, a consistent definition across the literature is integral, in order to permit the inclusion of a wider range of yips-affected athletes in future research and to permit comparison across studies. Accordingly, we recommend the use of the proposed two-dimensional definition that focuses on physical and psychological symptoms, or combinations of both. This should help researchers provide a broad and multi-disciplinary understanding of the predictors and mechanisms of the yips, and will aid practitioners to develop effective interventions in both competent amateurs and the most elite athletes.

2.4.7 Post study literature

Since the completion of this review (December, 2013) and prior to submission of this thesis, a literature search using the same key words and search engines revealed five further published papers (Bennett et al., 2015, 2016; Klampfl et al., 2015; Milne & Morrison, 2015; Philippen, Legler, Olan, Schuetz, & Schack, 2014) that have helped further our understanding of the yips. Of these papers one utilised a case study approach (Milne & Morrison, 2015), one utilised a qualitative approach (Bennett et al., 2015), and the remaining three utilised an experimental approach (Bennett et al., 2016; Klampfl et al., 2015; Philippen et al., 2014). In the case study paper, Milne and Morrison (2015) found that 10 hours of a cognitive behavioural intervention proved effective at reducing the yips symptoms by 50% while improving performance, concentration and satisfaction of the yips-affected golfer. However, it was not highlighted if the golfer was classified as type-I, type-II, or type-III yips-affected.

In the qualitative study Bennett et al. (2015) interviewed 16 elite level athletes who had experienced either lost movement syndrome (LMS; n = 8) or the yips (n = 8). The yips-affected athletes included golfers (n = 5) and cricketers (n = 3), while the LMS-affected athletes included athletes from trampolining (n =4), gymnastics (n = 1) and diving (n = 3). The findings revealed four higher order themes: emotion, cognition, physical and wider impact. The authors concluded that the yips were similar to LMS, specifically due to the lack of perceived control of physical, emotional and cognitive states and the intense psychological distress associated. They finally highlighted that both yips and LMS may be considered a complex interaction of emotional, cognitive, attentional and situational characteristics.

Of the experimental studies two focussed on the kinematic variables associated with the yips (Klampfl et al., 2015; Philippen et al., 2014) and the final study focussed on psychological variables (Bennett et al., 2016) associated with the yips. Klampfl et al. (2015) conducted a two-part study assessing the differences between self-report yip and kinematic variables. The first study, used self-report measures of the yips highlighted 22.4% of golfers experienced the yips (from a sample of 1,306). In the second study, they adopted a kinematic screening test to see if the prevalence rate would be similar to previous study. They identified yips-affected individuals as being those with obvious twists and jerks in their putting. They revealed that the prevalence rate was 16.7% (from a sample of 207). However, they did not distinguish between the three types of yips-affected classifications. Philippen et al. (2014) also investigated the yips in golf by assessing movement kinematics (rotation velocity) and physiological variables (EMG) in yips-affected (*n* =6) and unaffected (*n* =6) golfers. Their findings revealed no significant difference in EMG between the two groups. Furthermore, they found that issues with kinematic variables were only exhibited when putting with the dominant hand only. However, the low sample size will only have been powered to detect large effect sizes.

The final experimental study investigated the role of psychological predictors on the experience of the yips and LMS (Bennett et al., 2016). Bennett et al. (2016) investigated the role of perfectionism, rumination, reinvestment and perceived stress in their worst situation between type-I yips-affected athletes (*n* = 15) and those unaffected (*n* = 15), and also in those LMS-affected athletes (*n* =15) and those unaffected (*n* =15). The participants came from a range of sports: for the yips sample this included golf (*n* = 8), cricket (*n* = 8) and darts (*n* =6); the LMS sample included athletes from diving (*n* = 4), trampolining (*n* = 18) and gymnastics (*n* = 8). They were equal participants from each sport in the paradoxical-affected group and the control group. The findings revealed that increased levels of perfectionism, rumination, reinvestment and perceived stress are likely to increase the vulnerability of experiencing both the yips and LMS, and that both forms of paradoxical performance were equally distressing. However, due to the small sample numbers, these findings may not provide a true representation of the yips and, as such, warrant further investigation.

These five studies have contributed further to a growing field of research into the yips in sport which support the main conclusions reached within the current systematic review. For instance, these five studies further emphasise that the majority of the research still focuses primarily within golf. They further strengthen the proposal of a lack of clarity associated with the yips classification, as there is only one study that classifies the participants as type-I yips-affected (Bennett et al., 2016), particularly with experimental studies. In conclusion, these studies provide some novel insight into the role of psychological, kinematic and physiological variables independently, but it is imperative that future research looks at these simultaneously to gain a greater understanding of the complexities associated with the yips, especially laboratory based research. Consequently, chapter three of this thesis will focus on expanding the yips literature into archery, by exploring the experience of elite levels archers who experience target panic.

Chapter 3: "From World Class to unable to shoot in three arrows"- An understanding of the personal experience of Target-panic and choking in elite archers

The previous chapter revealed that the majority of studies investigating the yips have focussed primarily on golf. Consequently, an alternative sport was selected for investigation, where target-panic (archery specific yips) in archery is salient and not yet understood in elite levels archers. A similar qualitative approach to previous studies which investigated the yips and choking in golf was adopted (Bawden & Maynard, 2001; Bennett et al., 2015; Hill et al., 2010b). Given that the yips (particularly type-II and type-III) and severe forms of choking have been highlighted as sharing a number of similarities, as highlighted in previous qualitative literature (Bawden & Maynard, 2001) it is important that both these phenomena are explored collectively to allow for a greater understanding of the similarities and differences. Consequently, this will be the first study to explore these two simultaneously in the same sample of elite archers who have experienced both. This will enable the study to explore the lived experience of those who have experienced both choking and the yips to identify potential predictors associated with each. Therefore, the current chapter will start to address aim two of the current thesis by investigating potential predictors associated with paradoxical performance. This will be achieved by completing objective two of the thesis which is to qualitatively explore the experience of elite level archers to gain an understanding of potential predictors associated with target-panic and choking.

3.1 Introduction

Anxiety has been highlighted as being a pertinent factor in paradoxical performance research and has shown to influence the experience of both yips-affected and choking-affected athletes similarly. As such an understanding of choking may provide greater insight into the psychological characteristics associated with the yips (Chapter two, Masters, 1992; Day, Thatcher, Greenless, & Woods, 2006). This is particularly pertinent as Lobinger et al. (2014) reported that the yips may be a reaction to one-significant laden choking experience or a conditioned response to many previous chokes. Choking has been previously identified as an acute performance where there is a discrepancy between an athlete's resources and the demands of the situation. Consequently, a reduction in performance occurs during which an individual experiences fear of failure, increased arousal and anxiety (Hill et al., 2010a). Guiccardi, et al. (2010) reported that choking is a complex interaction of emotional, cognitive, attentional and situational characteristics and that the emotional component has research limited attention. Therefore, one aim of the current study will be to expand our understanding of this component within both yips and choking experiences.

There have been many attempts to explain the processes behind these paradoxical performances (Beilock & Carr, 2001; Eysenck & Calvo, 1992). To date, there are two clear cognitive and attentional processing theories that have been proposed to explain the anxiety-performance relationship; ACT (Eysenck et al. 2007) and the CPH (Masters, 1992). ACT suggests that individuals expend valuable working memory resources with task-irrelevant stimuli and so do not have sufficient available resources to complete a task. In contrast, the CPH suggests that athletes under pressure, attempt to consciously control automatic movements, which in turn, affects the fluidity and smoothness of execution (see chapter one for a more detailed discussion of these processes). Both provide plausible explanations of why anxiety may negatively influence performance. However, personality dispositions (e.g., self-consciousness) and type of skill (fine motor/gross motor) act as moderating variables for both these processes (Mesagno et al., 2012). As such, these personality and skill types need further investigation before clear conclusions can be drawn (Hill et al., 2010a).

Within the yips research, the understanding of the underlying aetiological processes is less clear given the multi etiological nature of the yips (Lobinger et al., 2014). The two-dimensional model proposed in chapter two suggests that anxiety plays a key role in the experience of type-II and type-III yips-affected athletes, however, it further notes that those experience type-I symptoms are exacerbated when experiencing anxiety (Altenmuller & Jabusch, 2009; Bawden & Maynard, 2001; Smith et al., 2000; 2003). Thus, highlighting the importance of anxiety in the experience of the yips.

As seen in chapter two, anxiety has been the most popular psychological characteristic measured within the literature on the yips with inconclusive findings, specifically when comparing trait and state measures of anxiety between those yips-affected and non-affected. In summary, these studies found no difference in trait anxiety and higher levels of state anxiety before performance in those that were yips-affected compared with unaffected individuals (Adler et al., 2011; Klampfl et al., 2013; Sachdev, 1992; Stinear et al., 2003). Therefore, an individual’s perception or interpretation of anxiety may be a greater explanation for the effect on performance (Hanton et al., 2004). Hill et al. (2010b) found that elite golfers reported a negative interpretation of anxiety symptoms before they experienced a choke. Thus an understanding of the psychological characteristics associated with other paradoxical performances may help provide an insight into the yips. This suggestion was supported through qualitative accounts of the yips in golfers and cricketers alike, who described experiencing negative emotions, heightened self-consciousness and internal focus on possible mistakes, and viewing situations as threatening (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger et al., 2011). These are comparable characteristics to those who suffer with extreme forms of choking (Guiccardi et al., 2010; Hill et al., 2010b). Furthermore, it has been identified that paradoxical performances such as Lost-Movement Syndrome (Day et al., 2006) and the yips may be forms of performance phobias (Silva, 1994). Performance phobia is when an athlete experiences feelings of fear related to performing the affected motor movement because of the consequences associated with an inability to perform the desired action (Silva, 1994). This further emphasises the psychological and emotional distress associated with experiencing paradoxical performances.

It has also been suggested that significant life events can act as a contributing factor for the onset of the yips or other movement disorders (Roberts et al., 2013; Rotherham et al., 2012; Thomas, Vuong, & Jankovic, 2006). Studies have reported that life events such as the death of a significant other or sport specific trauma (dropped catch, embarrassment) were prevalent in the onset of such disorders (Bawden & Maynard, 2001, Rotherham et al., 2012). Both dissociation theories and conversion disorders discuss that psychological pain associated with a significant event are frozen in time and converted to physical symptoms, where people subconsciously try to prevent re-experiencing this negative event (Baker & Humblestone, 2005; Thomas et al., 2006). Furthermore, Day et al. (2006) identified that significant experiences in sport (injury, poor performance, and vicarious experiences) were comparable to trauma experiences (car crash), and initiated similar behavioural responses to those who experienced trauma (fear, panic, and avoidance). Thus, it is plausible that psychological factors associated with lived experiences, can provide insight into the onset of and experience of the yips. This further supports that the yips can originate from a very significant emotion laden experience (Lobinger et al., 2014).

The majority of the literature to date has investigated paradoxical performances like choking and the yips using questionnaire-based measures (Clarke et al., 2015; Hill et al., 2010a). However, recently researchers have adopted qualitative approaches to investigate the lived experiences of those with the yips (Bennett et al., 2015; Philippen and Lobinger, 2011) and choking (Guiccardi et al., 2010; Hill et al., 2010b). Furthermore, there is limited research focussing on these forms of paradoxical performances in sports outside golf (Chapter two; Guiccardi et al., 2010). Specifically, no literature to date has focussed on choking or target-panic (a form of the yips) in archery.

Archery is a relatively static sport which requires upper body strength and endurance, with specific emphasis on the shoulder girdle and forearm (Ertan, Kentel, Tumer, & Korkusuz, 2003; Mann & Littke, 1989). Performance is measured by the execution of repetitive fine motor skill, which incorporates an athlete's ability to shoot a number of arrows at a particular target accurately within a specific time frame (Leroyer, VanHoecke, & Helal, 1993). Consequently, successful execution of a shot requires extreme precision. Although archery is fundamentally different in skill to other sports where the yips have been researched, there is commonality with the fine motor skill and precision nature to sports like cricket and golf (Bennett et al., 2015; Bawden & Maynard, 2001; Philippen & Lobinger, 2012). Thomas (2008), in an article for the New York Times, reported target-panic as experienced archers losing the ability to maintain composure and control their bow, which manifests in the archer releasing the bow to quickly or to freeze to a point where they cannot release it at all. Although target-panic is a colloquial term among archers, it is yet to receive any empirical research. This is important to provide an insight into other sports where the yips may manifest differently.

Thus, the aim of the current study is to provide a clearer understanding of the thoughts, feelings and emotions associated with good, bad (choke) and target-panic (yips) performances using semi-structured telephone interviews. This novel approach will allow for a greater understanding of the similarities and differences of both forms of paradoxical performances. Thus, granting a unique perspective of the different psychological constructs and predictors that are influential in both the yips and choking experiences respectively, which will partially address the second aim of the current thesis. The structure of the interview will incorporate similar aspects to recent qualitative accounts of paradoxical performances in choking (Guicardi et al., 2010) and yips (Bennet et al., 2015). Similar to Hill et al. (2010b) and Bennett et al. (2015), elite athletes will be used in the sample, allowing for a greater appreciation of the emotional, cognitive, attentional and situational characteristics associated with paradoxical performance, whilst permitting an unrestricted exploration into the specific concepts of target-panic. This qualitative approach will allow for completion of the second objective of this thesis.

3.2 Method

3.2.1 Participants

Seven elite archers (*M*age= 32 years, SD+/-11.03) were interviewed over the telephone, consisting of four females and three males of Olympic, World, European and Commonwealth standard. Participants met the following inclusion criteria: international level athlete aged 18 or over. The participants were recruited using opportunity sampling and through the National Governing Bodies who it was agreed would remain anonymous. Research complied with The British Psychological Society's (BPS, 2009) and British Association of Sport and Exercise Science ethical guidelines (BASES, 2009) and ethical approval was obtained from the Life Sciences Ethics Committee (Ethic approval Number: 02-12-PC) at the University of Derby. All potential participants received an information sheet and a consent form which was completed prior to participation (See Appendix A). All participants are referred to using a pseudonym.

3.2.2. Materials

The telephone interviews were recorded in a sound proof room with a Dictaphone. The interview schedule (see Appendix B) was developed through discussions with supervisors and review of previous qualitative literature and key studies in the yips and choking (Bawden & Maynard, 2001; Guiccardi et al., 2010; Philippen & Lobinger, 2011). Furthermore, interviews were conducted according to Patton's (1990) interview guidelines, whereby a guide was constructed that included a number of lead questions with accompanying follow up and probe questions. This interview schedule ensured that each participant was exposed to the same systematic and comprehensive lines of enquiry.

The interview was split into two main sections: 1) general performance and 2) the yips. A number of segments were discussed within section one including: Characteristics of good and bad performance; thoughts, feelings and emotions associated with good and bad performances (before, during and after). Section two explored the archers' experience of target-panic including: descriptions of first experience of target-panic; conditions before the first exposure of target-panic; symptoms experienced; the environment in which symptoms were most apparent; descriptions of how they approached subsequent shots; any strategies they have used to try and overcome this; length of time experiencing target-panic symptoms;

their views and understanding of target-panic, and finally, the difference between a bad performance and a target-panic performance.

3.2.3. Procedure

The National Governing Bodies provided contact information for their archers who were emailed with a brief description of the study. Interested participants were sent a consent form to complete and no further communication was made with those that did not wish to pursue participation. Consenting participants arranged a telephone interview with the chief investigator, which took place over the phone on a loud speaker in a secure sound-proof room; the Dictaphone was placed in front of the telephone in order to record the conversation, which typically lasted between 50 and 90 minutes. At the end of the interview participants were asked if there was anything further they wished to that might be pertinent to gaining a greater understanding of target-panic in their experience. Participants were then debriefed (See Appendix C) and provided with an opportunity to ask questions before being thanked for their time (BPS, 2009).

3.2.4. Data Preparation and Analysis

All interviews were transcribed verbatim and analysed using inductive thematic analysis (Braun & Clarke, 2006). Thematic analysis provides an exploration and an in-depth understanding of an individual's experience (Joffe & Yardley, 2004). Thus, Braun and Clarke's six thematic analysis guidelines were followed including: familiarising yourself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing a report. Initially, two of the research panel read and re-read the transcribed interviews to ensure that they were comfortable with the data. All additional information related to the transcriptions were also included in brackets (such as "joking" or "replied ironically"). The aim of the next four steps of the inductive thematic analysis was to organise the raw data set into meaningful, interpretable themes and categories indicative of inductive thematic analysis procedures. This was achieved by clustering quotes together, which were then labelled as sub themes. These sub-themes were then categorised into themes that were reflective of the sub-themes.

The credibility and trustworthiness of this analysis was maintained through a process of triangulation between the two core researchers with guidance from a third research supervisor. Each researcher collated their key themes and sub themes that were perceived to be important, which were then compared with the information reported by the other researchers for consensus of opinion to be reached. This process allowed for individual bias be controlled to ensure that the themes generated were reflective of the raw data. This type of approach followed the procedure proposed by Patton (1990) and has been used by other qualitative research in paradoxical performance (Bawden & Maynard, 2001).

3.1 Results

3.1.1 Demographic analyses

The detailed table below (see Table 3.1) provides demographic information for the archers and their target-panic experience. The table provides information on the archer's age (years), experience (years), length of time suffering with target-panic (years), their description of target-panic and the frequency of their symptoms. During the interviews the archers identified a number of physical and technical symptoms experienced that are also detailed below (see Table 3.2).

Table 3.1:

Target-panic demographics

Participant	Age	Experience (Years)	Duration of Target-Panic (Years)	Participants description of Target-Panic	Frequency of Target-Panic	Situations affecting Target-Panic
1	31	24	0.5	Coming up and down whilst shooting and thought process	Inconsistent	Competition
2	53	10	5	No control over the release of the shot, twitching when shooting and fear.	Often	Competitive environments and indoor, confined environments
3	36	22	2	Issue with the clicker and aiming	Often	Most severe in competitive environments and small targets. Affects compound bows more
4	21	11	2	Fight of flight freeze response	Often	Competitive environments
5	28	17	1	Couldn’t pull string back to face	Always	All situations
6	22	7	0.5	Trying to be over precise and can’t shoot and freezing	Often	Competitive environments, indoor and small targets
7	31	17	0.5	Flinching and struggling to aim at the middle	Often	Competitive environments

Table 3.2:

A list of the physical and technical symptoms of target-panic

Type	Symptoms Experienced
Physical	Higher heart rate Lethargy Tiring Exhaustion Shoulder tension Feeling sick Tension Collapsing back muscles
Technical	Clicker clicked and fingers would relax Cant aim Freeze on spot Flinching when shooting Aiming too much Aiming at middle and not executing Executing and aiming low Early release Couldn’t fully draw bow Forward releasing Elbow going forward

3.1.2 Main analyses (Performance themes)

The thematic analysis revealed that three main themes (see figure 3.1) and 10 sub-themes were present across all three types of performance (Good, choking and target-panic) including: Mind-set (expectations, self-efficacy, and self-consciousness); Affect (mood, anxiety, dejection and fear); and Focus (conscious effort, thought control and analytical).

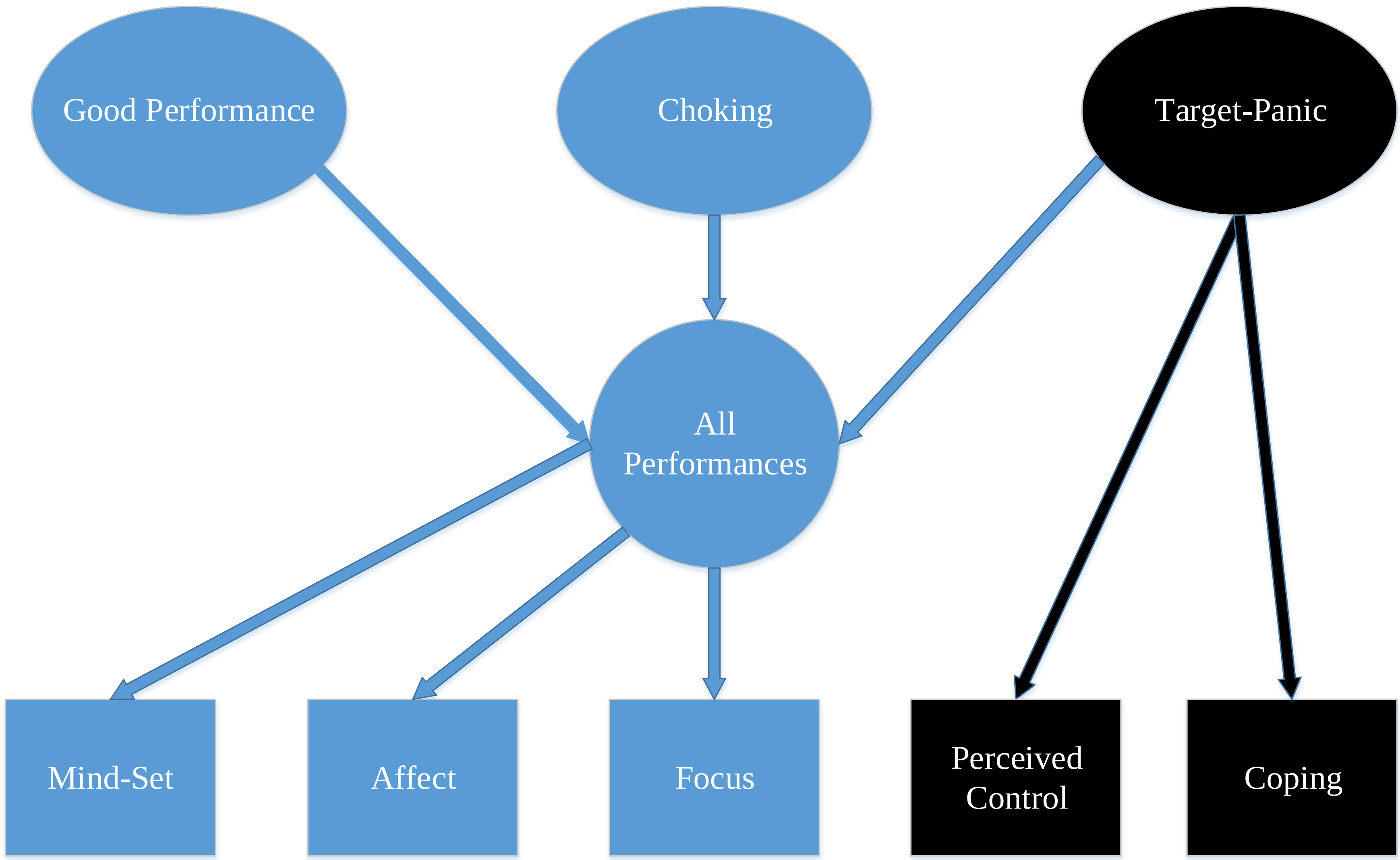

Figure 3-1: *The main themes that were revealed across all performances (Blue) and Target-Panic specifically (Black)*

3.1.2.1 Mind-set

This theme refers to the mind-set associated with the archers' experience during different performances (good, choking, target-panic) and includes three sub-themes: expectations, self-consciousness and confidence. All seven archers reported aspects of mind-set associated with the three sub-themes (See table 3.3).

Table 3.3:

Detail of the higher and lower order sub-themes for Mind-set

Mind-set	*Expectations*	Challenge Threat Internal perceptions External perceptions Expectation management
	Self-Efficacy	Importance Comfort Preparation
	Self-consciousness	Embarrassment Public comments Letting themselves down Confined environments

Expectations. This sub-theme refers to how the archers perceived upcoming events based on their current form. All the archers discussed in-depth aspects regarding expectations including: challenge; threat; internal perceptions; external perceptions, and expectation management. The excerpts below illustrate that when the archers performed well, they would view competition as a positive "*good challenge*". This allowed the archers to experience positive emotions and cognitions such as excitement and positive thoughts.

I will be feeling up for it, up for the challenge, but a good challenge…. I would be feeling good about myself quite up for the challenge and excited– Ryan

Feeling of possibilities … I don't think it's necessarily beneficial for me to thinking I am to win, but you definitely have the attitude that you can win- Oliver

In contrast, during paradoxical performances, archers explained an opposite view towards competition. The archers' revealed (in the quotes below) viewing competition as threatening to their current goal, which initiated rumination and negative emotions.

Consequently, this viewpoint made it difficult to adopt positive coping strategies to try and reduce impact on performance.

Generally, not up for the challenge, I would view the target as a threat than a challenge- Ryan

*Know the worst case scenario you just don't want to be there you know, you can't see a way of changing things around and this is how things start to spiral and you feel p****d off –* Natasha

I would say restricted sort of thing, it's just the sense of just, you can really think there is not an opportunity to do well, but an opportunity to come out of it, saving as much face as possible… -PJ

The archers suggested a number of factors that influenced the viewpoint they adopted originating from a range of internal and external sources. The excerpts below highlight external sources including teammates, crowds and fellow competitors. This was especially pertinent when significant others were in close proximity when performing, as the archers did not want to get embarrassed or let them down. These thoughts were especially prevalent during target-panic performances. The archers discussed the increased difficulty associated with remaining positive when teammates were performing well or had experienced similar target-panic symptoms.

Walking back to the team and we have all been sat like, wherever it was and we would all be talking about how we shot, and it's kind of awful to have to listen to other people talking, yea yea brilliant- Sharon

Teammates are there and support you instead of judging you kind of thing, you know it depends how you're thinking, if you're not shooting or you're not performing, you've got that expectation, its managing that and hopefully all you can do and if it's good enough on the days… If you have a roommate in the same condition (target-panic) or has shot really well it makes it even harder- Michelle

I want to shoot good in front of the crowd so I am a little excited about it- Niamh

Thoughts that I don't want to screw up in front of people or thoughts I don't want to embarrass myself in public, those sorts of thoughts…what am I doing physically who is watching, what my environment is rather than wow if I win this tournament would win 10000 dollars or I am going to be a world champion- Oliver

Feel kind of upset and you feel let down in yourself, I have been putting all this work in and it's not amounted to anything and it just makes you think, all this training has been a waste a *time, I suppose at a higher level, I am thinking all the people I am letting down, like if my dad was there*- Natasha

The archers also revealed the importance of expectation management. The excerpts below illustrate how an ability to acknowledge their current capabilities allowed for effective goal and expectation setting. If this was not done and archers were not able to meet these expectations, then negative implications ensued such as self-judgement and self-doubt. The passages below highlight that the ability to effectively manage expectations improved with experience.

It's acknowledging where I am, speaking to my coach and psychologist and sort of go again with expectation management…it will be acknowledging that it wasn't quite right and if you can work out where you can make it better if you can't and being it just wasn't your day… Michelle

This has to be perfect… so it's harder to keep track of positives going into the event, because you're constantly, anything that doesn't go to plan, well that hasn't gone right then that's sort of a negative, it's another negative to chalk up away from the perfect world…. I can manage expectations a lot better nowadays I think, when I was younger it was more of an issue, I wanted to do well at everything, but I think yea now... I am able to recognise quite quickly, I am able to lose that expectation or shake that expectation- PJ

During the archers' first experience of target-panic they admitted experiencing increased expectations, feeling that they needed to perform to a higher standard than current. The passages below revealed that the source of this expectation was ambitious career aspirations and international recognition. For instance, Michelle felt the added expectations associated with competing at an Olympic Games and the expectation of having "*to be medalling*" as contributing to her experiencing the symptoms. This added expectation was due to "*a lot of media, a lot of TV stuff expected a medal*". Therefore, it is clear that the archers perceived heightened expectations from external and internal sources, contributes to their experience of target-panic.

I am on the Olympic team and suddenly I have to be better than I was before…The scores I was getting was really high and possibly my expectations up with it, and that could have been where this sort of started from- Niamh

I had already built up a huge level of expectation, plan of where I should be and everything, and soon as I got that I was like, oh my god, I can't be doing this… I had that sense of I can't be seen to be missing the target here because, you know everyone expects me to win sort of *thing, everyone thinks I am the best here. They will just laugh at me or they will see that I am not actually that good if I miss the target here.* - PJ

Self-efficacy. This sub-theme refers to the athletes' levels of self-efficacy associated with performance. All the archers discussed the role of self-efficacy in performance including: importance; comfort; preparation, and consequences. The archers discuss the importance of confidence in general and situational specific (self-efficacy), as significant positive contributors to successful performance and not experiencing target-panic.

Would be lack of confidence… definitely in a nutshell it's all about confidence with me so…it's a big factor… You realise something is going wrong (target-panic), it destroys your self-confidence and that's what archery is, a lot of it is based on self-confidence, you don't think you can shoot well, you're not going to shoot well- Natasha

If you're confident in your shot and ability, you don't have target-panic…Confidence and relaxed in my ability to shoot…Confident, being comfortable and relaxed then that would be an ideal situation to be in prior to shooting- Ryan

The archers discuss being efficacious ensured a feeling of invincibility and a level of comfort in the surroundings, the competition and the performance required to achieve the desired outcome. This permits the archers to feel strong and happy in their ability to perform their physical and mental routines effectively. Interestingly, Niamh, in the passage below reports that consistent high levels of performance can sometimes lead to feeling uncomfortable with trying to reach expectations and can have negative implications on performance and cognitions.

All comes together and feels right, I feel strong and really confident in what I am doing- Sharon

Joy, happiness, satisfaction I guess…. that feeling of just emm invincibility that it gives you sort of thing… With confidence…you don't really tell yourself anything, I certainly don't tell myself anything when I am shooting well because I believe I can do it really – PJ

I feel comfortable in my surroundings…Comfortable going up to the range…If I am shooting 10 or 20 points ahead of what I have ever done before and I think that was too big for me to feel comfortable with…. I would feel uncomfortable to be shooting so well you feel like so it's that fear- Niamh

When the archers experienced a paradoxical performance they reported lower levels of confidence in conjunction with higher levels of anxiety. During these performances if a good shot was executed they would feel shock rather than jubilation. Subsequently, they perceived the situation as hopeful rather than expected.

I will look at the target, deflecting probably the wrong word but would look at it anxiously not confidently…When I am shooting, instead of thinking the arrow is going to go into the middle; I am hoping it will be going into the middle- Ryan

When you do make a good shot, it is a little bit of a surprise, like it's almost like you're taking desperation into the next shot, to keep it going, so like that was good, let's keep that going. All the time sort of thing, rather than a belief, yea ok, this is the normal shot sort of thing, rather than see it as a positive you see it, or a surprise, like oh that was a bit of good sort of thing, I hope I can keep that going in that respect- PJ

Preparation was noted as the key source of self-efficacy. The archers reported performance in training as a key factor in allowing them to get to the shooting line in a confident manner. The archers indicated in the following passages, that consequences of performance have implications on confidence and subsequent training sessions. As such, when they competed well and confidence was high, high levels of performance were achieved in training. If performance was poor and confidence was low, training was more difficult.

I will be feeling confident…. confident about my shooting leading up to the competition especially if good shots are backed up in the store from practise- Niamh

Confident in myself …quite pleased of what I have been putting into practise. Choosing how its working and wanting to keep doing what I have been doing- Sharon

Less than confident so you could train but don't feel very confident that you could be able to maintain that change, in your competition, so I think technically you want to be a hundred percent happier with everything in your shot, being able to do that for some period of time and things just change, that's the worst that could happen- Natasha

Self-consciousness. The final sub-theme within the mind-set theme focusses on the archers' perceptions of self-consciousness when performing including: embarrassment; public comments; letting themselves down, and confined environments. Self-consciousness was something the archers discussed as being increasingly pertinent in choking and target-panic performances. The excerpts below emphasise the embarrassment the archers felt when they experienced target-panic.

You're comfortable of being in that environment; you lose that degree of self-consciousness... I think it's more prevalent when you're in a bad performance and making a mistake…again embarrassment linked to that, also embarrassment of the result you have ended up with, where you finished and what it says to other people about you effectively- PJ

How you are going to be viewed, just the thought of making a mistake, when you make a mistake once and not being able to move on from it, and the thought of it happening again, increases anxiety- Sharon

The archers also discussed the influence external comments from the crowd or coaches had on their performance. They appreciated the positive feedback received from the crowd, but discussed the difficulty of not allowing the negative comments to impact them such as doubting their ability and questioning whether they should be competing at this level.

You know you appreciate the public compliments people give you…but too much emphasis on that, but when people give you negative comments it hard not to take them on board, it's a bit dangerous one, you can't have your own self-worth on other people opinions or you will end up with too many highs and too many lows really- Oliver

Feel again people are judging you on how you shot, like for example when I was with the national team, you were, even though I imagine they weren't thinking these things, it was like, you think everyone feels that you're not worthy to be there. Other people that could have been there over you, it's just like I more think about the people I have let down and what other people would think of me, rather than thinking, this went wrong, work on that in practise and it will be fine next time- Sharon

The archers also discussed the influence of critical feedback from significant others such as coaches, negatively influencing their feelings of internal self-consciousness, particularly focussed on their technique. Subsequently, the archers would try to overcome the target-panic symptoms by trying to consciously control their movement, with negative consequences. These feelings were particularly pertinent when performing indoor where it's easier to hear comments from the crowd.

…the worse cause was when you were indoors, quite confined and a lot of people there, and you get the feeling of people watching you, and you do something like that or you, you miss (haha) and someone would comment on it and I guess it makes it worse that you have not performed well- Ryan

think my worst performances I must admit, I had a coach when I was on the national squad, and he was just so critical about everything I did and it would, I would never seem to perform well when he was there, I don't know if it was me thinking, make sure you don't do this right, or you are going to get a telling off, I don't know whether it was because he was there and I wanted to make sure I was shooting well but, if I was shooting well, let's saying I was doing one part of my technique right, he would say something else that wasn't and tell me that wasn't going right, so then I would start focussing on that and something else would go *wrong, sometimes it depends on who was with me, I tended not to shoot as well, when this coach was with me*- Sharon

…most people are analytical, or most people who are umm, more self-conscious are more likely to place meaning, on results and are prone to suffering from it – PJ

In summary, expectations, self-efficacy and self-consciousness all were influencing factors for performances. The mind-set adopted by the archer, both positive and negative, had implications on the emotions experienced, which will be discussed in the next theme.

3.1.2.2 Affect

This theme refers to the emotions associated with the archers when experiencing different performances (good, choking, target-panic). The theme includes four sub-themes: mood, anxiety, dejection and fear. All seven archers reported aspects of affect associated with the four sub-themes (See table 3.4).

Table 3.4:

Detail of the higher and lower order sub-themes for Affect

Affect	*Mood*	Frustration
		Calm/relaxation
		Happiness
	Anxiety	Doubt
		Nerves
		Negative thoughts
		Implications
	Fear	Time
		Mistakes
	Dejection	Love of Sport
		Giving up
		Not Feeling on top of things

Mood. The first sub-theme focussed on the positive and negative emotions associated with performance at an elite level by all the archers including: frustration; relaxation, and happiness. For instance, Ryan highlighted that “very strong emotions” are associated with experiencing target-panic, especially as the nature of international competitions requires optimum performance on multiple successive days. The main negative emotion experienced by the archers was frustration, which was particularly prevalent during paradoxical performances, especially choking. Those feelings of frustration, influenced both the archers' mind-set and their ability to control their focus to remain positive. As such, Michelle and Oliver revealed the ability to cope effectively with this frustration is key, in order to ensure subsequent performances are not impacted.

Your just left frustrated you can't do it really...I would say frustration and a constant in your mind, the thoughts become more like a hurricane in your mind…all shrouded in frustration I would say… as sense of despondency that your trying to claw your way out from, your kind of, it's a natural disappointment washes over you, and because you kind of know, you got to remain positive sort of thing, try and pull yourself back from this negative rut- PJ

I would get really frustrated at myself, because I know I can do it, so why aren't I doing it, so it doesn't help when I get more frustrated I am getting angrier at myself, and my shots aren't going well, I am thinking to myself you are messing this up, you can do, why aren't you doing it, rather than just thinking, just concentrate on your routine and it will just come together- Sharon

*Nobody likes to do poor performance, but you're always going to have these thoughts, it how you deal with them, I get down, I get p****d off, I get frustrated, always these things, it's to what level you let them take over your life, that's the difference*- Oliver

You know frustration particularly internationals, when you have to compete the next day you know, if you still have a chance at another medal match or something, if it's just you more frustrating and it winds you up a wee bit... it's how you can control that so it doesn't affect your next shooting- Michelle

Conversely, during positive performances the archers indicate the importance of being calm and relaxed, particularly during the shooting process, as seen in the passages below by PJ and Ryan. This level of calmness and relaxation was indicated as being a positive factor in the preparation for competition, allowing the archers to execute precision movement successfully. As such, the archers discussed the importance of being able to self-regulate their emotions, especially after poor shots, to ensure they remained calm by using techniques as seen in the excerpts below by Niamh and Michelle.

Really really relaxed…. relaxation in myself, both off the line and on the line…try to keep myself calm as possible and keep everything fluid and as loose as possible…staying calm as possible - PJ

I will be quite relaxed prior to the shot…relaxed and confident- Ryan

I prefer the calmer side, calm and ready for the challenge… Calm and just taking things in your stride even if they are bad - Oliver

Stay calm to make sure I think about what I need to think about, think about breathing as it helps get rid of the nerves… Things will feel right and things will feel relaxed… During match play my emotions can be all over the place…can change quickly…. I don't want them to change too much- Niamh

Calm but with that little buzz, if it doesn't work you're not getting wound up about it and let it affect the next few shots…shooting three great ends and then miss the next three shots- Michelle

In addition, the archers identified the role of happiness as being a key factor when performing well. This feeling allowed the archers to feel excited about upcoming competition. Happiness was identified as being a key factor influencing levels of confidence and anxiety experienced during the shooting process.

Be happy, I always shoot better when I am happy…doesn't seem to affect my confidence level… I think just generally happy- Niamh

Excited almost to get going and get set off so I can start shooting…. anticipation…frame of mind to go type of thing and get started…pumped up and ready to go- Sharon

When things are going well, I may go this thing is going well, I am enjoying this, nothing specific set, just see how it goes on the day really…The arrows are going in the middle and its great I am happy- Michelle

If I am not happy with the way I am shooting, then the outcome of the shot will be different and I won't be happy about that, I tend to lose confidence and get more anxious and that impacts the shooting style…a vicious circle- Ryan

Anxiety. The second sub-theme focussed on the levels of anxiety experienced by the archers during performance. All of the archers discussed the role anxiety played during all three types of performances (good performance, choking performance and target-panic performance) including: doubts, nerves, negative thoughts and implications. The archers used different terminology when discussing this including self-doubt, anxiety, nerves and stress. Some of the archers reported self-doubt as being the biggest hindrance on their performance.

Thing that hinders the performance when it comes in, is probably doubt, self-doubt, I think if your indecisive in any way, is very honest in that respect and will show up- PJ

When the archers were performing well they credited this to having reduced levels of anxiety and stress. Of interest, Michelle and Natasha revealed an awareness that nerves are prevalent in all performances, but the ability to control them and use them in a positive way was key.

… loose thoughts but I think there minimal amount of stress and I feel relaxed and comfortable when I am shooting…No real struggle or stress effectively- PJ

The positive affirmations, I am always nervous, I never compete when I am not nervous, at high level I work with, I like that little buzz in that nerve, but it's about keeping it under control- Michelle

You're going to have that thought pop into your mind of your going to "screw" this up…. competitions are absolutely ok to feel nervous…it means your excited for the competition- Natasha

Similarly, when performing poorly the archers discussed the influence anxiety had on the performance outcome, revealing it as a "downward spiral" such that as nervousness increases, performance deteriorates. Furthermore, the archers illustrate that during these moments, it is easier to have negative thoughts than positive ones. Natasha describes this as negative nervousness that relates to a lack of confidence.

If your very much in the middle of something it's hard, negative thoughts are always easier to have than positive ones aren't they- Michelle

Again I would feel nervous, but I probably feel more negative nervousness or again a lack of confidence again…and that leads to a downward spiral. Not really ready for it- Natasha

The root of these anxious thoughts during performance was something that was also divulged by the archers. They indicated that nerves and anxiety are influenced by external factors such as the performance of fellow competitors and how their performance matched this. The impact of these nerves include despondency, shaky limbs and an inability to execute their desired shot routine.

I would almost not want to be there, I would rather be at home, I would be feeling anxious, feeling nervous……and anxious about how I scored and I will be wondering where I have come in relation to all the other scores, be concerned about how I shot, I would be worried, despondent that sort of thing, I would probably want to collect my kit, pack up and go home- Ryan

I would be more nervous than usual… Getting on the shooting line, when I am about to shoot, be a bit more shaky and then you can't and it all tumbles into one, I am a bit nervous, I am a bit shaky when I am shooting, then I can't do my shot routine right because I am a bit shaky and as I was saying that spiral all comes into one- Sharon

It is evident from the last two quotes that those increased feelings of nervousness directly influenced the focus of the archers which disrupted their shot routines. Specifically, when the archers experienced target-panic they reported heightened levels of anxiety due to the uncontrollability of the target-panic symptoms and that the environment becomes threatening. As such, Ryan further indicated a source of anxiety stemmed from an inability to commit to shots.

It turned into a feeling of not being in control and worried and upset, bad things- Niamh

It's not committing to the shot because you're anxious, because you're nervous, which means you can't commit, it makes you much more anxious, much more apprehensive about it, and you don't want to shoot that way again- Ryan

...yea it was a threat, I considered a threat, I was anxious about shooting, in many ways I didn't want to do it, you know in extreme case I didn't want to do it- Ryan

Oliver, however, felt that the anxiety associated with trying to please a very strict and negative coach brought on his target-panic symptoms, especially as he felt he did not have the ability to cope effectively with this. PJ, Sharon and Natasha all felt that anxiety was the cause of their target-panic. In summary, anxiety and symptoms associated with anxiety play a key role in the prevalence and experience of choking and target-panic.

Fear. This sub-theme discusses the role that fear plays during the experience of target-panic specifically. This is unsurprising given the name used for the yips in archery, thus emphasising the fear or panic associated with the target. All of the archers mentioned this fear associated with performance, with three in particular (Ryan, PJ and Sharon) talking in detail about it. They discussed the fear of trying to shoot the arrows in an allotted time when experiencing their symptoms.

It's the sense of panic when you're against the clock you kind of thinking you need to get rid of these arrows rather than do my routine, you're thinking, get rid of the arrows, get rid of the arrows- Sharon

It's all psychological, it's the fear of what you're doing, but if you're not confident about what you're doing, if you're scared... you almost try and avoid doing it, by copping out of the shot basically- Ryan

PJ suggested, in the passage below, that those who get target-panic may become so afraid or scared of making a mistake. Consequently, this can be very difficult to overcome it and the impact it has on the probability for success.

It was just a gut feeling of fear, a sense of dread...I am not going to win anything if I do that, immediately I created that meaning and that thing to fear- PJ

Dejection. The final sub-theme reflected the archers' feelings of dejection during their experience of target-panic. Niamh identified these experiences negatively impacted her love of the sport. She also describes the inner battle she would endure whilst performing with her target-panic symptoms and the negative emotions that ensued, as detailed below:

I just wanna go home, I had really bad regret and just hated archery and I wanted to go home… it feels like your battling, like between I don't care and I wish it would go away to I really want it ….It made me feel really sad and upset, and like I was useless, angry as well, I felt angry afterwards, letting it get to me, all sorts of bad feelings and emotions- Niamh

As evidenced in the quotes below, it is clear that recent performances had negative implications on the state of mind and emotional state of the athletes. Some of the athletes felt "*down in the dumps*" because of their career expectations.

It was anxious, feeling a bit down, depressed, the fact that my performance was down- Ryan

It's so disheartening, you know I was ready to pack up and everything and never go back- Michelle

These negative emotions caused some athletes to question whether they should retire from archery. In PJ's example below, symptoms were associated with a very traumatic experience of almost drowning, again emphasising the traumatic impact of target-panic.

when it doesn't go right and you don't carry it through all the way, that feeling of trying to constantly stop yourself from drowning, never quite get far enough, or far over above the surface- PJ

In summary, the influence of mood, anxiety, dejection and fear had an influence on the archer's performance and experience of these symptoms. These emotions both, negative and positive had an impact on the archer's ability to focus, that will be addressed in the next theme.

3.1.2.3 Focus

This final theme refers to the archers' focus before, during and after different performances (good, choking, target-panic). This theme comprised of three sub-themes: conscious effort, thought control and analytical. All of the archers discussed the aspects of all three sub-themes (See Table 3.5)

Table 3.5:

Detail of the higher and lower order sub-themes for Focus

Focus	*Conscious Effort*	Autopilot
		Difficulty
		Reinvestment
		Remaining positive
		Implications on future shots
	Thought Control	Focus on Process
		Focus on Outcome
		Intrusive thoughts
	Analytical	Alteration of goals
		Career Aspirations

Conscious Effort. This sub-theme involves how much conscious effort was required for competing when experiencing different performances (good, choking and target-panic) including: autopilot; difficulty; reinvestment; remaining positive, and implications on future shots. From the passages below, the archers illustrated how little conscious effort was required for successful execution of physical and mental routines indicating how automatic these processes were using terms such as "autopilot" and "second nature". This provides further insight into the minimal cognitive resources required for highly skilled athletes to execute skills.

Second nature, yea everything just happens … Shot is very easy, the timing would be very very good… good stem rhythmic timing… It's difficult to remember how you felt, emm because you're so focussed- PJ

Feels easy, not over analysis… The days that are the best are the days where it just happens and you hardly need to do anything really…not over trying…I am using my mental programmes and I don't have to put much effort into it- Natasha

Is running on auto pilot and a feeling of confidence…process it's just flying, you need to flip the switch and it will take care of itself…. autopilot mode and you're doing the thing you have programmed yourself to do time and time again and the few times over the period where you are well and truly in the zone… I am not working on it or I am not conscious of it, it's working it is having its desired effect- Oliver

However, when the archers were under increased pressure and experienced choking they discussed losing the automaticity of skills previously mentioned. The excerpt below indicates that during choke and target-panic performances, the archers consciously focus on movements required for successful execution, rather than experiencing unconscious automatic movement elicited during good performance.

It's harder to shoot, it's harder to shoot a good shot than it's to shoot a poor one (choking) - Ryan

When its performance, you're probably, I personally again over analyses, I would be thinking through things probably too much, emm more than I normally would, so perhaps over trying, over thinking everything technically (choking)- Natasha

I am putting in, more concentration than I feel like I normally do, and it's just not coming together, I am overly focussing rather than having a just do it attitude (Choking)- Sharon

So they harder you try the worse it gets if that makes sense…which then drops your performance, (Target-Panic) – Ryan

…and it caused me to try to hard is how I would put it in brackets or speech marks, over trying (Target-Panic)- Oliver

Specifically, during target-panic the archers indicated using the reinvested effort differently, such as focussing on negative experiences of previous target-panic solutions instead of possible solutions or normal routines. In another instance, the archers focussed on trying to remain positive and to ignore the symptoms associated with their target-panic experiences.

…that thought is in your head that this is happening you and you don't want it happening to you, your trying really really hard not to, and of course your focussing on it and it then makes it worse- Oliver

it took an enormous amount of being positive and trying to ignore the fact this isn't right; this isn't what you do. So great sense of effort went into it- PJ

I think I was just concentrating so much on lining the sight with the target face then just shooting, so I was starting to concentrate on where the arrows were going, rather than the technique- Sharon

It will make you not settle and throw the next arrow of, instead of going back and going ok, those six weren't any good, let's start from here and see what we can do on this one, and shoot the next six arrows worse as your trying to harder and you aim a little harder and you hold the bow a little bit longer, again I think it will just reflect back and make it worse- Michelle

Interestingly, Michelle (in the excerpt above) indicates the difficulty of trying not to let one experience of target-panic influence subsequent shots. Therefore, these quotes would indicate that an individual's ability to control their cognitive resources and how they are used is important for good performances and will be discussed in greater detail in the next sub-theme.

Thought Control. This sub-theme portrays the archer's ability to control their cognitive resources during performance including: focus on process; focus on outcome, and intrusive thoughts. As seen in the extracts below, during high level successful performance, all the archers focussed on the process of the shot in particular. This involved expending their conscious resources with their desired technical and mental routines.

When I am performing well there isn't a great deal of process like, it's a continuation of the process isn't it, I am just topping up…. I need to refocus my mind, re-train, re-practise to try and get back to the level I need to be at to perform well- Ryan

The mental programme is absolute number 1, fill my conscious mind and just keep doing the normal shot routine taken over…. if my mind starts thinking about past or future, you recognise those and then have something else to do or think- Natasha

I am focussing on my shot routine or my end of shot routine- Michelle

Conversely, during paradoxical performance, the archers would direct their focus on uncontrollable factors such as the competition or outcome etc., which was not necessarily linked to good performance. As such, the archers expended their cognitive resources with task-irrelevant thoughts that had negative implications on their performance. As such the archers tried to remove these thoughts.

But you can't control the outcome- Michelle

Focus on the process not the outcome…. think about the situation and who I was up against… I can't control if I win or lose, I can control how I perform… If you have done a good job, and that doesn't necessarily link to the outcome either- Oliver

But if my thoughts go onto performance or outcome of that tournament then I will try and recognise that and remove myself… The score, the weather, the goal of winning the tournament but I can't control that so I don't spend a lot of time on it- Natasha

I will be focussing much more on the outcome of shot rather than the shot itself and poor outcome will reinforce that I am not shooting well…. more focus on the outcome and reinforce my feelings of anxiousness if it doesn't perform well you know- Ryan

When the archers were discussing their experiences of target-panic, they reported how susceptible they were to negative and intrusive irrelevant thoughts. Which they acknowledged these thoughts had negative implications on their performance, particularly influencing their ability to execute automatic pre-performance routines. As such, the archers were using their attentional resources to focus on negative past experiences as illustrated in the excerpts below.

that something is interrupted, the shot gets interrupted by something mentally like a block or a negative thought, so you start again, or a lot of people that have it, know it's coming… I probably just gone over the negative feelings associated with it as well, rather than focus on the things I did manage to do right, and focus on just the worse bits of it – Niamh

your brain would be shouting at you, what are you doing, this isn't you, this isn't what you do, emm, and so you just had to, when trying to solve it, you kind of had to live with bad performance or bad scores while just because, every time you tried to do it, you would have this tension sort of thing- PJ

Analytical. This sub-theme focussed on the analytical nature of the archers when they experienced target-panic including: alteration to goals and career aspirations. For example, Ryan identifies that his focus in competitions now becomes "*how many shots*" he can aim at the middle or how many shots he can shoot without getting any target-panic symptoms. He further identifies that he did not fully appreciate what target-panic was when the symptoms began, but knew the impact it could have on his performance. Like Ryan, Oliver appreciated the detrimental effects that this disorder could have on his performance, stating below that this could be a massive limiting factor.

…goals were how many shots can I aim at the middle, how many shots can I shoot without twitching, to refocus my game, it was no longer about how well I could perform, it was about, how well, how far I could go through a competition without going like that…… I became aware that I have a problem here and then you start thinking about it and that highlights it and just makes it worse- Ryan

I was aware that it was going to be a total limiting factor on my performance but nothing else mattered cause that was always going to be the limiting factor on how well I done- Oliver

Subsequently, it was evident that the archers spent a lot of time reflecting on their experience of target-panic, as such, they were aware of and appreciated the potential negative implications on both their performance and career aspirations. For example, Sharon knew it "*would hold her back*". This was especially apparent for a number of the archers who experienced these symptoms early in their career as illustrated in the passage below by PJ.

I knew it was mistakes, I had already mapped out my whole career in my head, it was going to be great, I was really going to be a great archer, at this age I should be doing this, at this age I should be performing at this level, if I don't hit this mark there I will be behind schedule, and all that sort of thing- PJ

In summary, the archers' ability to control how they directed their attentional resources and what they focused on had important implications on their performance. This was particularly prominent in the paradoxical performances.

3.1.3 Main Analysis (Target-Panic specific)

The thematic analysis also revealed two further themes (see figure 3.1) and six sub-themes that were only present during target-panic experiences namely: Perceived control (control over movement, commitment and conscious control) and Coping (rationalise, mental and technical).

3.1.3.1 Perceived Control

This theme refers to the archers' perceived control over a number of performance aspects including the draw and release of the bow during an experience of target-panic. The theme was split into three sub-themes: control over movement, conscious control and commitment. All seven archers reported aspects of perceived control (See Table 3.6).

Table 3.6:

Detail of the higher and lower order sub-themes for Perceived coping

Perceived control	*Control Over movement*	How it manifests
		Difference between target-panic and choking
	Conscious control	Lack of conscious control
		Movement needing to be subconscious
	Commitment	Avoidance of opportunity where you have to commit
		Courage to make decisions

Control over movement. Perceived control refers to the perceived physical control over the participant's technical movements. All seven archers felt "*out of control*" of their movement when they experienced target-panic. For example, Niamh explained:

I couldn't control it; I couldn't do what I wanted to do- Niamh

Although all archers experienced a lack of physical control, it manifested in different ways. This was discussed by Ryan, Oliver, Michelle and Sharon, who all identified an issue with the release process (the shooting of the arrow). However, the passages below illustrate how the symptoms manifest differently for each archer.

You don't have control over the release- Ryan

Collapsing my back muscles upon release, it is in an uncontrolled manner- Oliver

I would punch my finger and pull my hand down really quickly to try and almost flick the arrow up, but there was no control over that- Michelle

You feel you are out of control… it doesn't feel right anymore as you can't control pulling through the clicker and shooting- Sharon

Six archers (Michelle, Sharon, Natasha, PJ, Oliver and Ryan) identified this lack of perceived control as one of the main differences between target-panic and a poor performance, with some of the archers identifying it as a "*conditioned response*". Sharon specifically reported below that she felt….

…out of control in a poor performance but in more control than a target-panic…but in a poor performance I know what is going wrong but target-panic it just feels like completely out of your control – Sharon

Target-panic is an uncontrollable conditioned response…. which is something I couldn't get rid of - Oliver

Therefore, it appears that an archer's perceived control over their physical movements plays a key role within target-panic in archery. Furthermore, this physical control was also linked by participants to a loss of conscious control which will be discussed in the next theme.

Conscious control. Conscious control refers to the participants feeling that they had conscious control over their actions. The archers discussed that the movement would occur automatically without a conscious decision being made. It was also highlighted by the archers that those who rely on making conscious decisions to release the arrow are particularly susceptible to experience target-panic symptoms. This suggests that skills where conscious decision making is integral for successful execution, may be a risk factor for experiencing target-panic symptoms, as seen in the passages below.

You're not making a conscious decision to let go of the arrow or let go of the string, but it just happens without thought… anyone who is consciously deciding to let go now is more likely to end up with target-panic- Natasha

You don't consciously trigger the final moment of execution- Oliver

If you're not performing well and you have target-panic, it's not subconscious in any way…. your conscious mind is trying to control it but you have no control over it - Ryan

The archers also discussed their confidence to remain committed to the shot and the techniques used as a key component of the conscious decision making process and will be addressed in the next sub-theme.

Commitment. The final sub-theme of perceived control was commitment, which refers to the participants' ability to commit to their shot while they are shooting an arrow. The archers reported that target-panic is triggered from an inability to commit to, or make decisions on when to release the arrow. The excerpts below illustrate this, with the archers not wanting to commit to shots, and in some instances bringing the bow back down.

It's bizarre, you could aim at the middle and not reach full draw or not aim at the middle and reach full draw, so you know it's like not committing yourself to it, you're avoiding the commitment- Ryan

I am determined to shoot the shot and get on with it, but then the same negative thoughts would come into the shot, and the more determined I would be the more negative the thoughts would be, so I would come down again- Niamh

The archers also acknowledge when experiencing these symptoms, there is a consistent struggle with committing to shots, and it takes real "courage" to execute a shot and go against the conditioned response. Furthermore, Natasha suggests below that this struggle with commitment is especially worse in "*pressure situations*".

To have the courage to make the decision to shoot the arrow myself, go against my hardwires… you can't really be consistent when performing in that respect – PJ

It will come out in pressure, so in pressure situations, you have to make a decision, most people struggle at that decision point, at what point do I push the button? – Natasha

Due to this inability to commit to decisions the archers discussed the importance of having coping strategies in place, which will be discussed in detail in the next theme.

3.1.3.2 Coping

This theme discusses the role and the ability of the archers to cope with their target-panic symptoms. All seven archers reported using some form of coping strategy throughout their experience of target-panic, including rationalisation, mental strategies and technical strategies (See Table 3.7). Oliver highlighted that athletes used strategies not as a cure for target-panic but as a coping mechanism, as highlighted below.

They get some people who are world class and they are always limited, because rather than fix the problem they are just putting coping strategies, where it would be better to not put in coping strategies and actual put in fixes- Oliver

Table 3.7:

Detail of the higher and lower order sub-themes for Coping.

Coping	*Rationalisation*	Not alone in experience Greater perspective
	Mental strategies	Importance The use of traditional methods The role of the psychologists
	Technical strategies	Blank Box Slowly adding stressors Changing technique

Rationalisation. The archers identified rationalising the situation by acknowledging they were not alone in experiencing target-panic, with the help of their coaches and teammates to cope with the situation. This allowed the athletes to accept the situation and alleviate the pressure or expectation associated with performance, particularly witnessing other high level athletes experience it.

…like it didn't feel any pressure on me anymore, so I think that sort of thing helped me in a way in terms of perception wise. That more people have it and I wasn't alone anymore- Sharon

…we had an Olympic medallist that have gone from having no problems then unable to hit a target in the space of three arrows, I actually watched someone from going from being world class to being unable to shoot in three arrows- Oliver

This form of rationalisation in conjunction with discussing their experience with teammates helped the archers to cope more effectively during their own performance. For example, Niamh, Sharon and PJ, found that it helped to put the impact of the symptoms into perspective to help them realise that it did not change them as people and did not affect their well-being or safety as seen in the excerpt below.

I am still here and I have performed badly like this, I have had this really low score just now and um it hasn't changed me one bit, I am still the same person, while, even though I have shot badly at an archery competition, there was nothing really at stake, in terms of my well-being, its only after that sinks in you start to repetitively tell yourself that it becomes easier and the feeling of dread goes away- PJ

This demonstrates that rationalising helped the archers to cope more effectively with their symptoms. This links closely with the next sub-theme, whereby the archers discuss the importance of mental coping strategies.

Mental Strategies. It was evident throughout the interviews that the archers reported the importance of being able to cope with the symptoms psychologically including: the importance; the use of traditional methods, and the role of the psychologist. As seen in the excerpt below, the archer discusses not having effective psychological strategies in place to cope with the ruminative associated thoughts, which had negative consequences on performance. Also, Oliver discussed archers would leave the shooting of the arrow until the last moment to ensure they did not focus on it too much.

I didn't really have any psychological strategies or anything like that because we didn't have a psychologist, so I tried to be determined to shot the shoot and get on with it, but then the same negative thoughts would come into the shot, and the more determined I would be the more negative the thoughts would be so I would come down again – Niamh

you have 20 seconds to shoot a shot in an Olympic final, and you wait until there is 8 seconds left on the clock and they know they can't think twice they have to shoot the arrow, they have to shoot it, if they draw to shoot it with 20 seconds on the clock they know they can be un-committal- Oliver

Oliver reported that he found traditional psychological techniques were not beneficial in his experience and that Eye Movement Desensitisation and Reprocessing (EMDR) was the only approach that had proved effective. Sharon however, found a solution-focussed imagery technique proved to be effective in helping her deal with her symptoms. This further suggests that the participants in the current study created their own or had tailored mental coping methods. However, the archers revealed they did not feel supported by their psychologists, who they felt did not understand the phenomenon.

Traditional psychological methods and by that I mean, positive planning, imagery, cards, things like that don't have a great deal of effect on things like that, I am really sad to say, *when we had some severe issues, the EMDR really is the only sort of therapy that seems to have a pretty proven record of helping*- Oliver

Target-panic is something different, I have had psychologist who beg to differ but I don't know if they really understood the problem- Natasha

It is evident from the quotes above that being able to cope psychologically with this phenomenon is important to those experiencing it and that the traditional methods do not seem to be effective. Furthermore, this highlights the need for practitioners to better understand the condition in order to be able to effectively aid the archers.

Technical Strategies. The final sub-theme focussed on the archers' discussions of the technical strategies to help cope with their target-panic symptoms including: blank box; slowly adding stressors; and changing technique. One of the key strategies identified by the archers was the use of the blank box, which is a target with no target face. This method removed the outcome of the shots allowing the archers to shoot at a target and focus on just their technique. Oliver found this was the only way to get rid of target-panic as it allowed him to change his technique so that he would not experience the symptoms. Ryan and Natasha also found that this type of process allowed them to actually shoot an arrow. Specifically, Natasha reported that she was able to shoot again by slowly adding stressors whilst she was shooting at the target face. This allowed her to be able to cope more effectively when performing again. Similarly, Michelle felt this approach took away the pressure and expectation of needing to hit the middle of the target.

the only way to totally get rid of it was using a blank target, one or two metres away because I made a total step change in how I executed the shot, by going to a process that action, and that fixed it as all of those bad pathways weren't being used at all- Oliver

Finally, Niamh also found that changing her technique (she stopped using her scope to spot her arrows between shots) helped her to keep her rhythm whilst shooting. This enabled her not to dwell on where the arrow landed so there was no consequential effect on future shots.

3.4 Discussion

The aim of the current study was to provide a novel exploration of the thoughts, feelings and emotions associated with successful and paradoxical performances (choking and the yips) at elite level simultaneously. Similar to recent qualitative studies on paradoxical performances (Bennett et al., 2015; Guiccardi et al., 2010), a semi-structured interview explored the lived experiences of elite archers, before, during and after these types of performances. The status of participant recruited in the current study allowed for a more detailed understanding of the lived experiences of athletes who suffered with paradoxical performances (Bennett et al., 2015; Hays, Thomas, Maynard, & Bawden, 2009; Hill et al., 2010b) and was the first to recruit athletes of an elite, Olympic standard for qualitative interviews. This is the first paper, to the author's knowledge, that explores paradoxical performances (choking and target-panic) in archery and the first to investigate these two forms of paradoxical performances simultaneously. This allowed for a greater appreciation and understanding of the potential predictors of paradoxical performance, which may not have been achieved with a sub-elite sample. The findings revealed three themes and 10 sub-themes that were associated with all types of performances (good, choking and target-panic): mind-set (expectations, self-efficacy and self-consciousness); affect (mood, anxiety, fear and dejection); and focus (conscious effort, thought control and analytical), The findings also revealed two themes and six sub-themes that were specific to target-panic alone: perceived control (control over movement, conscious control and commitment) and coping (rationalisation, mental strategies and technical strategies).

The current findings illustrate that target-panic is a form of the yips, evidenced by the similarities in experiencing freezing and a lack of control of movement with specific limbs in conjunction with psychological symptoms, such as heightened self-consciousness and increased anxiety, usually manifesting in fear before performance, similar to the yips (Bawden & Maynard, 2001; Bennett et al., 2015). Further, the experience of target-panic is similarly distressing to the yips in golf and cricket (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011) and Lost Movement Syndrome (Bennett et al., 2015; Day et al., 2006). This highlights the similarities experienced between the disorders, with the one key difference being how the physical symptoms manifest in terms of which limbs are influenced. The physical symptoms experienced by the archers in the current study (See table 3.2) manifested during the release or aiming phase of the shot. For instance, the archers would release the arrow before achieving full draw, or they would achieve full draw but would not be able to release due to freezing, or they would experience a jerking action prior to release causing them to miss the target. Although, there is a difference in the exposed limbs in target-panic compared to other forms of the yips, there are similarities in the situations where the symptoms manifest. Like with golf, darts and cricket, the symptoms are prevalent during the aiming and release phase, for example a cricketers experience an inability to release the ball when bowling (Bawden & Maynard, 2001). Consequently, throughout the rest of this thesis target-panic in archery will be referred to as the yips in archery.

Recent reviews of paradoxical performances have identified that qualitative approaches were needed to provide a clearer understanding of potential predictors and mechanisms associated with choking, the yips and other movement disorders (chapter two; Hill et al., 2010b; Lobinger et al., 2014). The current findings support previous suggestions that these forms of paradoxical performances are multifaceted involving interactions of several emotional, cognitive, attentional and situational components (Bawden & Maynard, 2001; Bennett et al., 2015; Guiccardi et al., 2010; Hill et al., 2010b, 2013), as evidenced in the range of themes and sub-themes. Throughout this section we address each of these key areas by highlighting how the themes are associated with each other, and discuss how they link with key theory and literature associated with paradoxical performance.

It is evident, from the plethora of experimental studies on performance under pressure, that the attentional and cognitive components are considered key in understanding the anxiety-performance relationship (Guiccardi et al., 2010, Hill et al., 2010a). This was particularly evident in the archers' experience, as they discuss components pertinent to each such as conscious effort and thought control, within the Focus theme. Specifically, the archers discussed how their working memory resources would be expended on irrelevant cues such as the outcome, or by consciously focusing on controlling subconscious actions such as technical movements. This also provides further support for both the ACT (Eysenck et al., 2007) and CPH (Masters, 1992) as explanations for why performance deteriorates under pressure through the influence of internal and external cues on athlete's attention.

During both forms of paradoxical performances, the archers revealed increasing conscious effort to try and improve performance, to no avail. This was particularly evident during target-panic experiences as archers tried to control their physical symptoms (i.e., movements). Indeed, one archer described that the harder they tried, the worse they performed. Woodman, Akehurst, Hardy and Beattie (2010a) revealed that increased conscious effort can have both positive and negative implications on performance, based on the type of effort invested. For instance, if effort is invested to help consciously influence normally automatic processes, then negative implications on performance are likely, which supports CPH (Masters, 1992) processes. Conversely, positive performance can be experienced if conscious effort is invested for motivational purposes (Eysenck & Calvo, 1992; Vancouver, Thomson, & Williams, Kristiansen 2001). Within the current study, it is apparent that the archers invested effort for conscious processing purposes and as such experienced negative implications, for example Sharon felt "*I am putting in, more concentration than I feel like I normally do, and it's just not coming together, I am overly focussing rather than having a just do it attitude (Choking)"*. Thus, the type of effort invested rather than the intensity of effort may be a more important predictor of performance.

Performance outlook was also highlighted by the archers as influencing their attentional resources. When the archers were performing well, they adopted a process outlook, where they focussed on the key relevant stimuli associated with successful technical and mental execution. Yet when they experienced a paradoxical performance, they detailed experiencing an outcome outlook where they focussed on the opposition or leader board etc. The archers also identified the importance of being able to refrain from adopting an outcome outlook as highlighted by Natasha. "*But if my thoughts go onto performance or outcome of that tournament then I will try and recognise that and remove myself… The score, the weather, the goal of winning the tournament but I can't control that so I don't spend a lot of time on it"*. This supports Hill et al. (2010b) who reported elite golfers who experienced choking utilised an outcome focus (e.g., impressing others or scoreboard). Interestingly, Kristiansen et al. (2008) suggested that this may be explained by those who employ a task-oriented approach having more effective coping strategies than those who adopted an outcome-orientated one. These had more maladaptive coping resources, as seen in the example by Natasha above. This assumption is further supported by Guiccardi et al. (2010), who reported that elite golfers suggested reverting focus back to task-oriented stimuli as an effective coping mechanism for choking. Therefore, an athlete's outlook may provide one possible antecedent for experiencing a choke or a yip.

A contributing factor to the increased focus on outcome-orientated stimuli may be the archer's levels of expectation. Within the mind-set theme, the archers revealed during paradoxical performances having heightened expectations, supporting previous literature (Guiccardi et al., 2010; Hill et al., 2010b). The archers highlighted these expectations originated from both internal (self-judgment) and external sources (crowd, coaches, teammates etc.), both of which have been shown to have negative implications on performance (Butler & Baumeister, 1998; Krendl, Gainsburg, & Ambady, 2012) and influence the difficulty of goals set for competition (Bueno, Weinberg, Fernadez-Castro, & Capdevila, 2008). Interestingly, previous experimental literature within sport psychology identifies that setting challenging goals can have positive repercussions on performance (Kingston & Wilson, 2009; McKay, Lewthwaite, & Wulf, 2012). However, the belief an athlete has in achieving this will impact their perceptions of these expectations (Bueno et al., 2008; Hill et al., 2010b). The archers revealed that over time they were able to cope more effectively, by developing awareness of when they set unrealistic goals or felt intense expectations, so they could reconstruct their focus appropriately, which supports previous experiences of elite golfers (Hill et al., 2010b). As such, athletes may view goals as threatening if they do not have equivalent confidence or efficacy to achieve them. This emphasises the need for athletes to learn how to set appropriate goals for performance (Weinberg, Burton, Yukelson, & Weigand, 2000; Hill et al., 2010a) and the important role of self-efficacy and confidence.

This important role of confidence and self-efficacy was also highlighted by the archers as being key for performance. For instance, Ryan said "*If you're confident in your shot and ability, you don't have target-panic"*, highlighting that confidence could act as a buffer to experiencing yips symptoms. Hays et al. (2009) reported that confidence plays a major role in the type of performance experienced by world class athletes, and was supported by the archers in the current study, who reported when they excelled, they experienced high confidence in the ability to perform, as well as feeling comfortable within their surroundings and with fellow competitors. However, when experiencing a poor performance or a choke, they reported lower levels of confidence and not experiencing the same comfort previously mentioned. The archers also reported that confidence was mainly sourced from previous performances in both training and competitive environments. The sources reported by the archers accord with those reported in Vealey et al.'s (1998) Re-conceptualised Sport Confidence model and Bandura's (1997) Self-efficacy Model, such as lack of physical and mental preparation. As expected, the archers revealed previous experiences as being the biggest source of their self-efficacy.

It has been well documented that confidence and self-efficacy are key factors in performance, influencing a number of cognitive, affective and behavioural responses (Hays et al., 2009, Jones & Hanton, 2001), for example, how an athlete views the goals they have set for a competition. Furthermore, Vancouver et al. (2001) reported that self-efficacy positively related to the acceptance of difficult goals and consequent performance, which was particularly evident in the current study as the archers discussed viewing competitions and competitors when performing well as a "good" challenge. The ACT (Eysenck et al., 2007) proposes that individuals will only invest extra mental effort, if they believe they can complete the task, therefore confidence plays a key role in this. Interestingly, when the archers experienced a paradoxical performance, they viewed the competition in a more threatening manner, alongside experiencing a reduction in confidence. Turner, Jones, Sheffield, Slater, Barker and Bell (2013) reported that challenge and threat states have implications for cardiovascular measures (such as cardiac output and peripheral resistance) and that elite cricketing performance can be predicted based on this. The authors reported that athletes who exhibited more challenge-related cardiovascular response achieved greater performances than those who experienced more threat cardiovascular reactivity. Interestingly, those who exhibited threat-related cardiovascular responses, but performed well, reported higher levels of self-efficacy compared to those who exhibited threat-related cardiovascular responses, who performed poorly. Further, those who exhibited challenge-related cardiovascular responses, and performed poorly had higher avoidance goals than those who exhibited challenge-related cardiovascular responses and performed well. Indeed, the archers in the current study reported experiencing heightened levels of cardiovascular symptom's during both forms of paradoxical performances. In particular, the archers reported feelings of higher heart rate, lethargy, feeling sick and perceived exhaustion during target-panic. This is particularly important as the archers revealed that they needed to be in a relaxed state in order to perform to a high level. As such, this suggests the perception of upcoming events can have major implications on performance outcome.

When the archers were experiencing lower levels of self-efficacy they reported experiencing increased feelings of cognitive and somatic anxiety. This was particularly present in both forms of paradoxical performances discussed as evidenced in the anxiety sub-theme of Affect. The archers acknowledged that anxiety was also present when they excelled; however, when they experienced a choke or a yip it was more intense and negative. Although the cause of this anxiety differed between athletes, it negatively influenced their performance and consumed valuable working memory resources. This supports other qualitative accounts of choking and the yips in sport (Bawden & Maynard, 2001; Bennett et al., 2015; Guiccardi et al., 2010; Hill et al., 2010b) and experimental studies highlighting the intense relationship between anxiety and paradoxical performances (Beilock et al., 2007), particularly cognitive anxiety. Hill et al. (2010a), in a review of the choking literature, stated that athletes may experience anxiety in good performances, but it is the ability to cope effectively with this anxiety that was the difference between experiencing a choke and a normal performance. Collectively, these findings support that self-confidence can act as a moderator when interpreting anxiety (Jones & Hanton, 2001; Hays et al., 2009).

One of the main origins of anxiety stemmed from the archers' apprehension associated with negative evaluation in pressure environments. This supports previous qualitative reports (Guiccardi et al., 2010) of elite golfers who reported experiencing concerns with trying to attain social recognitions or to avoid judgement from external factors (crowd etc.). For example, the archers in the current study reported feelings of heightened self-consciousness, particularly embarrassment, negative public comments and not wanting to let down significant others. This was especially pertinent during yips scenarios, as the archers felt intense embarrassment associated with the symptoms experienced. Wilson et al. (2007) suggested that this is influenced by setting ego-orientated goals based on social approval (gain recognition with ability or avoid judgement), a form of outcome-orientated goal. The Self-Presentation Theory (Leary & Kowalski, 1990; Mesagno et al., 2011) suggests that athletes try to impress audiences not just with performances, but also with their behaviours, outward appearances, reactions and interactions with competitors, causing social anxiety: a sentiment supported by the archers in the current study particularly when experiencing target-panic. Of note, social anxiety is experienced when two conditions occur simultaneously: (1) the individual is motivated to make certain impressions on other people, and (2) the individuals do not believe that they are able to make the desired impression (Schlenker & Leary, 1982). This is evident with Niamh when discussing her first experience of the yips felt: *I am on the Olympic team and suddenly I have to be better than I was before"*. As such, when athletes strive to portray a perfect image, but perceive they are unable to, then this becomes a major source of anxiety and heightened self-consciousness in athletes during performance (Bennett et al., 2015; Guiccardi et al., 2010; Hill et al., 2010b).

During both forms of paradoxical performance, the archer's revealed heightened feelings of self-consciousness being particularly pertinent, which is seen within the Mind-set theme. The athletes revealed a number of consequences of experiencing heightened self-consciousness, including distraction from normal performance processes or increased self-focus on technical processes. These were perceived particularly during a yips experience when the athletes became very conscious of their physical and technical movements, supporting elements of both ACT (Eysenck et al., 2007) and CPH (Masters, 1992). This supports previous qualitative accounts within choking (Guiccardi et al., 2010; Hill et al., 2010b) and the yips (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). Further, this supports experimental research which revealed that trait measures of self-consciousness (Wang, Marchant, Morris, & Gibbs, 2004) and FNE (Mesagno et al., 2011) were potential dispositions for choking-susceptible athletes. In particular, it supports reports that higher levels of self-consciousness cause athletes to become more distracted (public self-consciousness; Geukes et al., 2012) or experience heightened levels of self-focus (private and public self-consciousness; Wang et al., 2004). Furthermore, athletes with heightened levels of FNE experienced performance deterioration during high-pressure (Mesgano et al., 2012). The current archers revealed that the ability to cope with these characteristics was a determining factor between good performances and paradoxical performances, particularly when competing publically.

To date, the majority of the performance under pressure literature has referred to the cognitive, attentional, situational and behavioural mechanisms associated with performance (Bawden & Maynard, 2001; Bennett et al., 2015; Guiccardi et al., 2010; Hill et al., 2010b). This study was the first to explore the role of emotional processes during experiences of the yips. The archers in the current study highlighted the important role that emotional processes play in their performance, which is evidenced in the affect theme, supporting similar qualitative accounts (Guiccardi et al., 2010). The archers in the current study revealed that, in competition, they experience a range of positive and negative emotions before, during and after performances. Hanin (2007) detailed the increasing importance of understanding emotion and its influence on athletes achieving the individual's zone of optimal functioning (Hanin, 2000). The archers revealed that during both forms of paradoxical performances, they experienced heightened levels of frustration, anger and fear (specific to the yips), which influenced their level of focus, especially when they were performing on successive days (which is required in many international competitions). In contrast, during successful performances the archers discussed feelings of relaxation and happiness, which have been revealed as important for athletes who perform fine motor skills to achieve the individual zone of optimal functioning (Hanin, 1997). Interestingly, some research has identified that negative or unpleasant emotions, such as anger and fear, in moderation do not always have negative implications on performance as they increase effort for motivational purposes (Hanin, 2000). Conversely, reporting positive emotions, such as enjoyment, do not always predict high levels of performance (Hanin, 2000). Therefore, this may suggest that wider emotions do play a key role in the experience of paradoxical performance, specifically if interpreted in a negative manner.

Guiccardi et al. (2010) developed a conceptual model of the choking phenomenon (see figure 3.2) incorporating emotional processes into our understanding of the choking process, based on the personal perspective of golfers. When performing under pressure, Guiccardi et al. (2010) reported emotional control as a significant factor associated with the three stages of their model; antecedent, choking event, and consequences. Specifically revealing that golfers discussed the importance of emotional control throughout performance, and particularly after an acute choking performance. Both archers in the current study and golfers in previous studies (Guiccardi et al., 2010; Hill et al., 2001b) have identified that an inability to control emotions after a choking performance is a foundation for prolonged experience of sub-optimal performance. Therefore, the current study supports the need for research into emotional profiling of athletes (Robazza, Pellizzari, Bertollo, & Hanin, 2008) as highlighted by Guiccardi et al. (2010). For example, future research could adopt Robazza et al.'s (2008) approach, where they conducted emotional profiling by recording athlete's idiosyncratic emotions and bodily symptoms during two environments: far from competition and anticipatory, followed by a retrospective performance self-evaluation to enable a more holistic view of the role of emotion during performance.

The current study's results revealed two main themes that were specific to yips experiences alone: perceived control and coping. The archers in the current study felt they had no control over their movements in pressure situations. This supports other qualitative accounts of the yips in cricket and golf (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2012). The archers in the current study perceived they had no control over two aspects of the shooting process in particular, the releasing of the bow and the aiming of the bow. Similarly, bowlers in cricket reported a lack of control when bowling, regarding releasing the ball (Bawden & Maynard, 2001; Bennett et al., 2015) whilst golfers experienced an inability to execute the putting movement smoothly (Philippen & Lobinger, 2012). As such, the lack of perceived control over physical movements may highlight a key differentiating factor between choking and the yips and warrants further investigation.

The current archers also reported having issues with committing to a particular shot when they were under stress, and perceived this as a contributing factor to the physical symptoms associated with the yips. In one instance a participant felt they needed real "*courage*" to make a decision. Similarly, Clark, Tofler and Lardon (2005) found that when an athlete starts to panic they begin to lose the ability to think rationally and, therefore, rely on instinct alone to perform. This is caused by an inability to recall explicit memory under perceived stress due to atrophy of the hippocampus in the brain where explicit memory is centred (Clark et al., 2005). Therefore, an inability to make rational decisions may cause an interruption of processes as the athletes try to battle between the rational shot to make, and instinct trying to take over the decision making process, manifesting in the early release of the shot.

As highlighted, the archers experienced a sense of fear when standing at the shooting line during a yips experience, due to the inconsistent nature of the symptoms. For example, Sharon discussed this fear "*It's the sense of panic when you're against the clock, your kind of thinking you need to get rid of these arrows rather than do my routine, you're thinking, get rid of the arrows, get rid of the arrows*". Le Doux (2014) discussed two types of fear experienced by individuals, conscious and less conscious fear suggesting that "*conscious fear can cause us to act in certain ways, but it is not the cause of the expression of defensive behaviours and physiological responses elicited by threat*" (p.3). This stemmed from another similar phenomenon called *amygdala hijack* (Le Doux, 2006) whereby, an immediate and overwhelming emotional response is triggered by a threatening stimulus, which is out of proportion compared to the actual stimulus (Le Doux, 2014), such as the environment explained by Sharon above. This is triggered by the emotional brain activating and reacting before the rational brain (or conscious brain) can (Le Doux, 2006). Le Doux (2014) provided further insight into the difference between the fear states, stating the less conscious fear state (emotional brain) causes the uncontrollability of symptoms, followed by a conscious level of fear (rational brain) in the form of anger, frustration etc. all of which were highlighted in the current study. Herbert (2012) identified that symptoms such as anger, fear, frustration and a lack of control are underpinned by anxiety and can be triggered by a single, or combination of emotional events. As anxiety plays such a prominent role in the experience of the yips, this could provide insight as to why individuals experience negative cognitive rumination during such an event (Bawden & Maynard, 2001; Bennett et al., 2015, 2016; Philippen & Lobinger, 2011) where, similar to anxiety disorders, an individual is in a cycle of re-experiencing an event and trying to overcome the issue (Bennett et al., 2015). Therefore, it may be proposed that the physical symptoms associated with the yips may be a reaction to the less conscious state of fear coupled with the interaction of the other cognitive and emotional components, i.e., the conscious brain (Bennett et al., 2015; Le Doux, 2014).

The final theme of Coping was reported by the archer's as being particularly important after experiencing the symptoms of the yips for the first time, revealing they experienced an inability to cope psychologically or physically with their symptoms. In particular, they reported using a number of avoidance techniques such as avoiding executing the particular move, specific situations or even removing themselves from the sport completely. This was also experienced by yips-affected golfers and cricketers (Bennett et al., 2015). Specifically, the archers waited until the clock was nearly up (e.g., two minutes to shoot six arrows) before shooting, to avoid the decision making process. However, this meant that they could not account for key factors such as weather, or learning from previous shots. Interestingly, the archers revealed using strategies similar to other yips-affected athletes and

LMS athletes (Bennett et al., 2015), including relaxation techniques, distraction, rationalisation, self-talk and visualisation (Bennett et al., 2015) to help aid these symptoms; however, the archers felt these strategies had limited effect on their symptoms. Furthermore, some of the archers identified that psychologists they have worked with, did not understand the problem stating *"Target-Panic is something different, I have had a psychologist who beg to differ but I don't know if they really understood the problem"*. Thus emphasising the frustration felt by the archers with the ability to overcome these symptoms. However, imagery was highlighted as an effective strategy for one of the archers, specifically using a form of solution-focussed guided imagery (guiding athletes through thoughts and feelings before the onset of the yips), which has shown some promise as an effective strategy in case study research (Bell et al., 2009; Bell & Thompson, 2007).

Interest in recent research has focussed on therapies that address anxiety components of traumatic life events such as Emotional Freedom Technique (Rotherham et al., 2012). One archer discussed Eye Movement Desensitization and Reprocessing (Shapiro & Forrest, 2001) as being an effective form of treatment for their target-panic symptoms. As suggested by Bennett et al. (2015), if these movement disorders are underpinned by anxiety, perceived as a significant life event (Rotherham et al., 2012) and are considered by the individual as being traumatic in nature (Day et al., 2006) it would provide rationale for the use of these forms of therapy as an effective intervention choice. However, as highlighted in chapter two a greater understanding of the different mechanisms associated with yips including the role of traumatic life events and the three different types (Type-I, II, III) is warranted to see if those athletes have different psychological traits or life experiences.

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Figure 3-2: *Guiccardi et al. (2010) conceptual model of the personal experience of the choking phenomenon*

The present study does not allow for conclusions regarding the underlying mechanisms of the yips to be made. It does, however, provide insight into the negative cognitive, emotional and maladaptive thought patterns associated with an archer's focus when trying to perform successfully, and that these factors may be a consequence of the yips symptoms as opposed to a cause. These findings revealed that factors such as anxiety, self-consciousness and fear, had negative connotations on both physical movement (apparent loss of movement) and psychological mind-set (confidence etc.) during both forms of paradoxical performances. However, the role that all these factors play on the longevity and severity of both paradoxical performances is unclear and warrants further investigation. Although it appears that there are a number of psychological factors associated with paradoxical performances, it is still unclear to what extent these factors may distinguish between those who experience choking and yips and those who do not. To date, there are limited studies that have tested the predictive value of psychological traits in the experience of the yips (Roberts et al., 2013) and choking (Geukes et al., 2012; Mesagno et al., 2012), and as such this is an avenue of research that is warranted and will be explored in latter studies of this thesis.

3.4.1 Strengths and Limitations

In addition to the research avenues presented throughout this section, there are a number of strengths and minor limitations of the current study that are worth taking into consideration. The current study enhanced the overall understanding of the yips and choking in sport, specifically providing a novel insight into the impact of the yips and choking on elite level archers. This study provides initial support for the inclusion of a Type-III component to the yips model (see chapter two) as the archers in the present study report experiencing a range of both psychological and physical symptoms simultaneously. As such future research needs to ensure that each of the yips type, to see if they are different predictors associated with each.

This is one of the first qualitative studies to investigate chokings and yips simultaneously, which allowed investigation by individuals who have experiences of both types of paradoxical performances. The current findings revealed that the experience of the yips follows a similar sequence of events to the choking process outlined by Baumeister (1984), evidenced by the levels of anxiety, self-consciousness, inappropriate focus and conscious control over movements experienced during both. Consequently, this makes it difficult to differentiate between a severe choking event and a type-II yip. However, these findings support Hill et al.'s (2010a) statement that understanding of the anxiety-performance relationship can provide some insight into the yips phenomenon. Interestingly, the archers reported more intense feelings of self-presentation concerns during yips performances compared to choking performances and this is an avenue that should be investigated.

It is worth noting that although all archers in the present study had experienced yips symptoms, not all were currently experiencing these symptoms. This, therefore, may have influenced their responses due to the length of time that had passed since they last suffered with these symptoms. As such, it could be suggested that some participant's answers may be potentially biased or distorted by false memory. Finally, this study aimed to explore the experience of elite level archers who have experience of two forms of paradoxical performances, we did not account the type of bow used by the archer, and therefore comparisons cannot be made, for example between recurve, compound and longbows. For instance, in compound archery shooting, individuals can use stabilizing and vibration eliminating equipment to aid performance (Simsek, Cerrah, Ertan, & Tekce, 2013) and thus can influence the level of attentional processes needed for performance outcome.

3.4.2 Practical Implications

The current findings provide some practical implications worth highlighting; however, there is obvious caution when generalising results from a sport-specific study to other sports (Guiccardi et al., 2010). First, the current study's findings reveal a number of potential precursors to both choking and yips experience as well as different situations in which these are exacerbated that can help inform practitioners and coaches awareness and understanding of the potential implication for their athletes (Guiccardi et al., 2010). Furthermore, this can allow coaches to simulate these situations in training so that athletes can develop effective coping strategies. Similar to previous qualitative studies (Guiccardi et al., 2010; Hill et al., 2010; Philippen & Lobinger, 2012), the current study's findings strengthen the need to provide athlete-centred efforts to develop effective pre-performance routine (imagery, self-talk, relaxation etc.) to ensure that athletes remain in a consistent, positive, confident mind-set for performance. Furthermore, teaching athletes how to effectively manage expectations through goal setting, to ensure that athletes remain focussed on the performance processes rather than the outcome of performance, is important.

Specifically focusing on the yips, these findings revealed that some athletes felt that negative critical messages from coaches was a potential antecedent for bringing on their symptoms, particularly in causing athletes self-presentational concerns. As such, coaches should be mindful of the type of feedback and delivery of feedback provided to their athletes. This study has also revealed a number of physical, technical and psychological symptoms pertinent to the yips that may allow coaches to identify early signs of the phenomenon. Finally, the current study revealed that archer's felt that practitioners did not fully understand the yips and as such this has meant that effective interventions have not been put in place. Therefore, practitioners and coaches need to be aware of the multifaceted nature of this phenomenon when considering potential interventions.

3.4.3 Conclusion

In conclusion, the present study assessed the thoughts feelings and emotions associated with good performance, choking and the yips in elite level archers. The findings reveal that both forms of paradoxical performance include a range of emotional, cognitive, attentional and situational components highlighting the complex nature of both phenomena. This study provides novel insight into the experience of target-panic in elite archery, suggesting that target-panic is a form of the yips in archery. These include a range of emotional, cognitive, attentional and situational components, including issues with aiming and releasing, with only the sport specific physical differences (movement execution on limbs) as distinguishable factors. These symptoms were experienced after a sudden and temporary loss of fine motor skills coupled with a range of psychological symptoms including rumination, intense somatic and cognitive anxiety, fear, embarrassment and panic associated with a loss of control of emotional, physical and cognitive factor, yet the cause of these symptoms is unclear. Finally, this study suggests that self-presentational concerns and fear of social evaluation was heightened during both paradoxical performances, especially experiences of the yips, compared to good performances, and thus, the next chapter aims to investigate these traits as potential psychological predictors of experiencing both the yips and choking.

Chapter 4: Personality Antecedents of Paradoxical Performances: The yips and choking

The previous three chapters have indicated a range of potential predictors associated with both the yips and choking experiences. Consequently, this chapter aims to develop further on two key findings from chapter three, whilst building on the existing literature revealed in chapters one and two. First, the current study aims to investigate the role that social factors play in instigating a yip or a choking experience. This is particularly of interest as chapter three revealed that feelings of self-consciousness, self-presentation and distress associated with social evaluation were more intense during yips experiences. Second, the current study aims to develop on the premise that interpretation of anxiety symptoms rather than intensity may be a greater indicator of whether someone experiences a paradoxical performance or not, given the findings of chapter three and previous literature. In light of this, the current chapter will focus on three types of personality predictors associated with both yips and choking: social (perfectionistic self-presentation, fear of negative evaluation and self-consciousness), anxiety (anxiety sensitivity) and perfectionism (multidimensional perfectionism) factors. In doing so, this will further address the second aim of this thesis, to investigate potential predictors associated with the yips and choking, by quantitatively exploring these (objective three of the thesis) using Qualtrics (online questionnaire software). This model will also address objective four by testing the validity of the newly proposed two-dimensional yips model from chapter two.

4.1 Introduction

Research has recently started exploring the influence of personality on paradoxical performances (Byrne et al., 2015; Hill et al., 2010a; Otten, 2009; Roberts et al., 2013). Personality has been assessed using two approaches: type-based assessments (to categorise individuals as one type or another) or trait-based assessments (to position individuals on a linear continuum). Each approach (type and trait based) has provided the foundation for the development of the Big-Five personality dimensions, which may not represent a specific theoretical perspective, but do provide descriptions of the most basic general dimensions upon which individuals differ (Allen et al., 2013). These dimensions include: extraversion, assessing interpersonal interactions; openness, assessing the desire to seek out new experiences;

neuroticism, assessing an individual's levels of emotional instability (e.g., anxiety and self-consciousness); conscientiousness, assessing goal directed behaviour and organisations; and agreeableness which assesses social harmony and concern for cooperation. This is a widely accepted model of personality trait structure (McCrae & Costa, 2008) that has been associated with performance in a number of personal, interpersonal and social domains such as academic performance (Poropat, 2011), job performance (Oh, Wang, & Mount, 2011) and team performance (Bell, 2007). For example, Bell (2007) reported that agreeableness, conscientiousness and openness to experience were strong predictors for team performance. This shows the influencing role these traits can have on a range of performance environments and, as such, deserve further investigation in sporting performance (Allen et al., 2013).

Masters and Maxwell (2004) discussed the potential role that personality can play in the onset of performance disruption during pressured environments. Similarly, recent reviews of choking (Hill et al., 2010a) and the yips (chapter two; Lobinger et al., 2014) suggest that more research investigating the role of personality traits as potential predictors, is warranted in order to identify those individuals more susceptible to yips and choking. To date limited research has assessed the role of the big-five, with regard to paradoxical performance; only one paper, to the author's knowledge, investigates this in relation to choking only (Byrne et al., 2015). Byrne et al. (2015) investigated whether any of the big-five personality factors could predict those who choke, and those who thrive under different forms of pressure. The findings indicated that higher levels of neuroticism and agreeableness were negatively associated with poor performance during social pressure, and social and time pressure. Byrne et al. suggested that this provides support for distraction theories such as the ACT (Eysenck et al., 2007; 2011), proposing that pressure environments particularly consume the working memory attentional resources of highly neurotic individuals.

Of these studies to have investigated personality traits as potential predictors of both the yips (Roberts et al., 2013) and choking (e.g., Mesagno et al. 2012), all have adopted a trait-based approach, allowing for an accurate assessment for personality test scores on a probability distribution (Allen et al., 2013). Yet more research of this nature is needed. Accordingly, the current study will investigate portential predictors associated with both the yips and choking including: the big-five personality traits, perfectionism, perfectionistic self-presentation, self-consciousness, fear of negative evaluation and anxiety sensitivity. These factors will be discussed in more detail throughout this section.

The predictive factor that has received the most attention in the paradoxical performance literature is anxiety (Masters et al., 1993; Wilson, 2008). As seen in chapter one, two and three, and previous literature performance anxiety has been highlighted as an important contributor to the three yips types in the two-dimensional model and the occurrence of choking (Hill et al., 2010; Lobinger et al., 2014). Athletes who have high levels of trait anxiety have also been identified as being more susceptible to choking (Baumeister & Showers, 1986; Masters et al., 1993; Wilson, 2008), yet this was not the case in those who experienced the yips (Adler et al., 2011; Klampfl et al. 2013; Sachdev, 1992). Although, caution is warranted when interpreting these results in the yips studies as small sample sizes were recruited that were only powered to detect large effect sizes (n = 24-50). As seen in chapter three and previous qualitative accounts, an individual's interpretation of anxiety may be a stronger predictor than intensity (Guicciardi et al., 2010; Jones et al., 2003). Furthermore, a review of generalised anxiety, by Newman and Llera (2011) suggested that extremely anxious individuals may be hypersensitive to changes in emotional states, which can directly influence upcoming events or performances, such as competition. Anxiety sensitivity is believed to be a stable trait-like characteristic (Schmidt et al., 1997) which relates to the degree to which an individual interprets automatic arousal as having harmful consequences (Schmidt, Lerew, & Jackson, 1997) and where, cognitive misappraisal of these characteristics may have negative implications for experiencing anxiety. As such, an understanding of a trait measure of an individual's perception towards changes in arousal may provide important insight into the role of anxiety within paradoxical performance. Therefore, the current study will provide a novel investigation of the role of anxiety sensitivity in athletes and hypothesises that those athletes who experienced choking and yips will report higher levels of social and cognitive concerns than those unaffected.

Based on the findings from chapter three and previous literature (Bawden & Maynards, 2001; Bennett et al., 2015; Guicciardi et al., 2010) there have been a number of underlying psychological factors that may instigate the initial increase of anxiety. Of note, the archers interviewed in chapter three of this thesis reported enhanced levels of self-consciousness in their choking and target-panic (yips in archery) experiences. Specifically, participants highlighted that self-presentational concerns, self-judgement and social evaluation (negative appraisal) were considered the main contributors to self-consciousness; (Bawden & Maynard, 2001; Philippen & Lobinger, 2011; Guiccardi et al., 2010) particularly during yips experiences.

Mesgano et al. (2011) proposed the Self-Presentational Model of choking, suggesting that self-consciousness (particularly public self-consciousness) and FNE negatively influenced sporting performance. This proposal is partially supported in chapter three in this current thesis, where athletes described wanting to avoid looking inept when performing in front of a crowd, particularly when performing at a higher level. Particularly the archers reported that during environments where there was an opportunity for social evaluation, they were more susceptible to experiencing both forms of paradoxical performance, but this was more intense during a yips experience. This suggestion has also been supported by previous qualitative accounts (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). Accordingly, the current study hypothesises that, individuals who have experienced the yips and choking will report higher levels of FNE.

Perfectionism is another factor identified as a potential predictor of the yips as highlighted in chapter one (Bennett et al., 2016; Klampfl et al., 2013b; Roberts et al., 2013), yet the literature to date have be unequivocal. For instance, Bennet et al. (2016) and Roberts et al. (2013) found five perfectionistic tendencies (personal standards, organization, doubts about actions, concern over mistakes and parental criticism) associated with yips behaviour. While Klampfl et al. (2013b) revealed no differences between any of the tendencies between those yips-affected and unaffected athletes. However, as reported in chapter two, this may be a consequence of low sample sizes (Bennett et al. (2016) and low scores for each measure reported (Roberts et al., 2013; Rice & Mirzadeh, 2000; Sapeja et al., 2011). Consequently, it is important that future research recruits a sample that is adequately powered to allow for an accurate conclusion to be derived and avoid a type two error.

Interestingly, perfectionism has been linked with self-presentational concerns. Sorotzkin (1985) reported that perfectionists experienced a compelling need for acceptance and admiration that manifested in a socially acceptable impression, which defends them from potential rejections, and promotes idealised social qualities. Furthermore, Schlenker and Leary (1982) suggested that an individual's impressions of self are constructed and defined by their self-belief and their individual goals in specific situations (for example in competition compared to a friendly social event). Consequently, Leary (1992) proposed that competitive anxiety revolves around the self-presentational implications of competition (providing an ideal image). Research has indicated that individuals, who attempt to create a public image which supports their preferred self-beliefs, will experience increased anxiety in situations where there is a chance of appraisal from both internal and external sources (Leary, 2001; Mesgano et al., 2009). Hobden and Pilner (1995) identified that perfectionists (especially those with socially prescribed anxiety) would utilise self-presentational or impression management strategies such as face saving or self-handicapping to cope effectively with socially derived impressions. Similarly, the interviews in chapter three support these findings; where the archers described that they needed to present the perfect image as an international elite archer. Therefore, when they were not performing well, they described experiencing issues with their impression management, causing heightened levels of self-consciousness and anxiety. However, research into paradoxical performance has yet to investigate this link, so the current study aims to provide a novel investigation of the role of self-presentational tendencies associated with perfectionism, such as, individuals trying to perfect how they are viewed in public (Besser, Flett, & Hewitt, 2010; Hewitt et al., 2011).

Hewitt et al. (2003) developed a perfectionistic self-presentational model that incorporated three facets of the self-presentation construct: perfectionistic self-promotion; non-display of imperfection; and non-disclosure of imperfection. Perfectionistic self-promotion distinguishes between an individual's pursuit of perfection in the eyes of others and a focus that involves diminishing the influence of the public perception (Higgins, 1998). Non-display of imperfection encompasses a desire to refrain from publically displaying any imperfections or presenting a less than perfect manner (Hewitt et al.). Furthermore, non-disclosure of imperfection comprises an avoidance action, whereby an individual abstains from verbal disclosures of any perceived or personal imperfections (Hewitt et al.). Flett and Hewitt (2014) reported that understanding these forms of self-presentation is particularly important when trying to understand people who perform in front of crowds. Interestingly, this model can provide an alternative insight into the role of social pressure and levels of self-consciousness when performing. Specifically, as public self-consciousness was highlighted as being a contributing factor to those who experienced choking (Geukes et al. 2012). The inclusion of Hewitt et al.'s model is particularly pertinent in paradoxical performance research; as chapter three revealed, self-presentation concerns were more frequent and intensified when experiencing the yips compared to choking. For instance, one archer discussed the feeling of target-panic "*just the* *thought of making a mistake in public, when you make a mistake once (in front of a crowd) and not being able to move on from it, and the thought of it happening again (in front of a crowd), increases anxiety"*. Thus, this study aims to investigate the role perfectionism and perfectionistic self-presentation has within both yips and choking experiences. Considering the findings from Bennett et al. (2016) and Roberts et al. (2012) it is hypothesised that athletes who experience choking and yips will experience higher levels of concern over mistakes, doubts about actions, and organisation within both forms of paradoxical performance. It is also hypothesised based on the findings in chapter three, that perfectionistic self-promotion, non-display of imperfection and non-disclosure of imperfection, will be significantly higher in the yips group.

Perceived control over an athlete's physical movement and psychological focus has been highlighted as a factor in the experience of the yips in previous qualitative reports and also in other movement disorders such as lost movement syndrome (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). Additionally, in chapter three, participants described perceiving a lack of physical and mental control when experiencing target-panic, compared to choking, when participants reported some level of perceived control. However, to date to the author's knowledge, this study will be the first to explore this phenomenon in movement disorders such as the yips. There is a need, therefore, for research to explore the role of perceived control and its influence on severity and frequency of symptoms experienced by yips-affected athletes.

4.1.1 Aims

This study aims to further address the second aim of the thesis to investigate potential predictors associated with the yips and choking, by quantitatively exploring these (objective three of the thesis). Specifically, there are three aims to the current study:

1) To investigate whether a number of individual and combined (additively) psychological traits (fear of negative evaluation, individual differences, anxiety sensitivity, self-consciousness, perfectionistic self-presentation and perfectionism) predict whether individuals are more likely to experience different forms of paradoxical performance, specifically the yips and choking.

2) To provide further insight into the demographics (Handicap, experience, age and experience) and the symptoms of athletes who experience choking and the yips.

3) To test the validity of the two dimensional yips model presented in chapter two based on the symptoms the athletes have experienced (objective four of this thesis).

4.1.2 Hypotheses

As there are 20 different variables being measured in the current study, these have been categorised based on their underlying construct (anxiety, social and perfectionism). It is hypothesised that public self-consciousness, social anxiety, fear of negative evaluation, perfectionistic self-promotion, non-disclosure of imperfection, non-display of imperfection, social anxiety sensitivity, neuroticism, physical anxiety sensitivity, cognitive anxiety sensitivity, concern over mistakes, doubts about actions and organisation would be significantly higher in yips-affected athletes compared to those unaffected. This is represented in the yips predictive models (YPM) below (Figure 4.2).

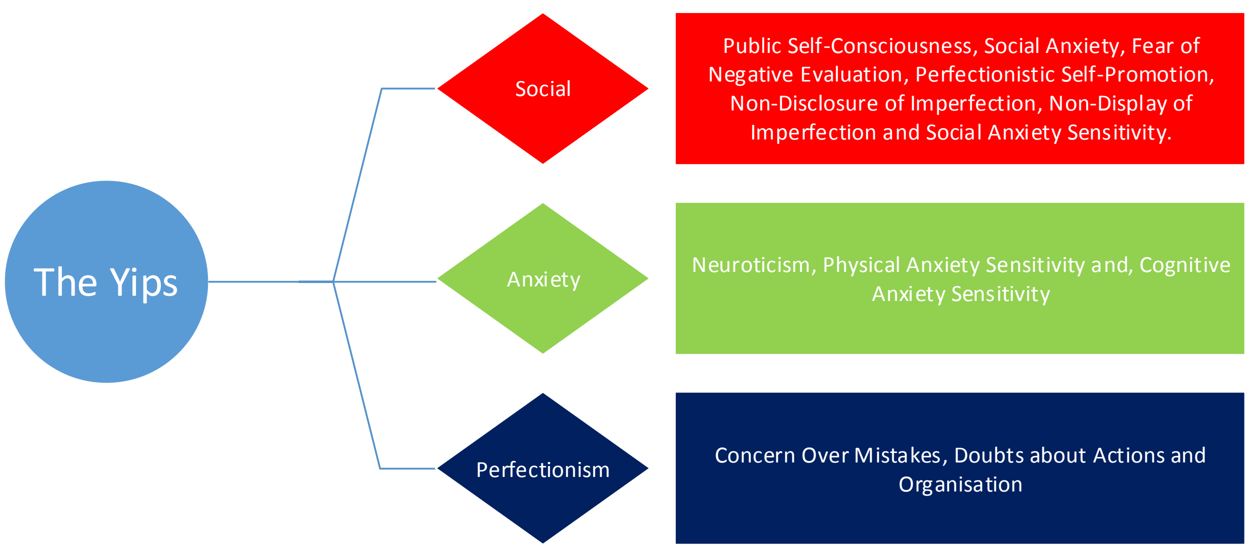

Figure 4-1: *The hypothesised Yips Predictive Model (YPM)*

It is also hypothesised that public self-consciousness, private self-consciousness, social anxiety, fear of negative evaluation, non-disclosure of imperfection, non-display of imperfection, social anxiety sensitivity, neuroticism, physical anxiety sensitivity, cognitive anxiety sensitivity, concern over mistakes, doubts about actions and organisation will be significantly higher in choking-affected athletes compared to those unaffected. This is represented in the choking predictive model (CPM) below (Figure 4.3).

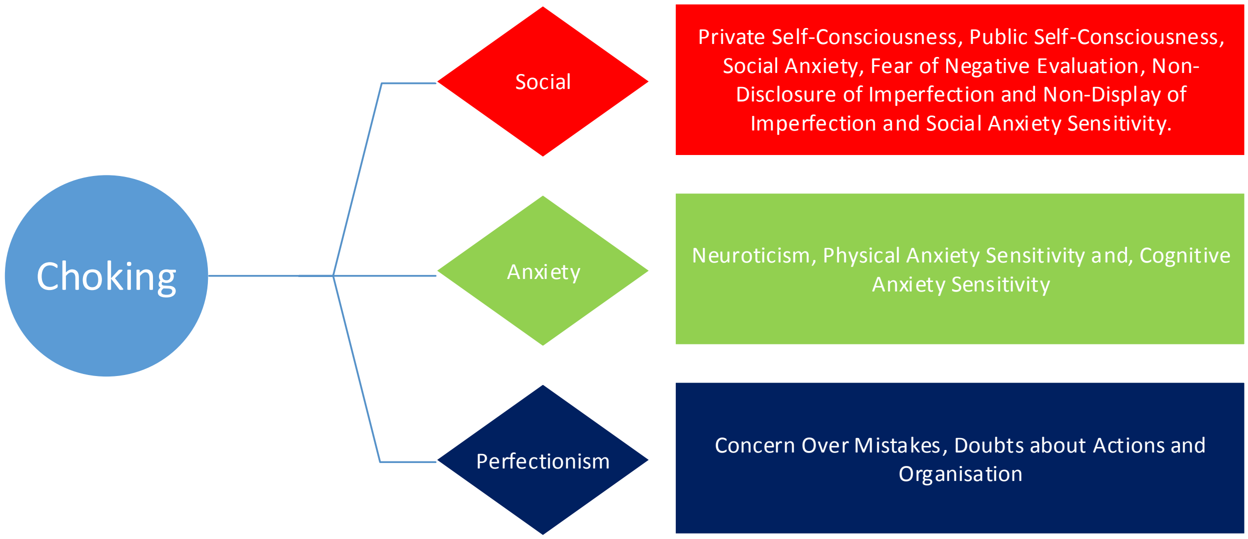

Figure 4-2: *The hypothesised Choking Predictive Model*

4.2 Method

4.2.1 Participants

One hundred and fifty-five (Male *n* = 78, *M*age = 43.35, SD =14.48; Female *n* = 23, *M*age = 47.70, SD = 11.47; unknowns *n*= 54) participants volunteered to take part in this online questionnaire study; 54 participants' gender and age were not recorded (due to an issue with computer software). An *a priori* power analysis conducted in G*Power revealed that the 50 participants would be sufficient to detect a small to medium effect size (partial η^2) of .08, assuming a power of .08 and alpha of .05. Using the findings from Roberts et al. (2013) paper, where the effect size ranged from *d* = .52 to *d* = .035, the conservative estimate of the potential effect size in the current study was deemed appropriate, due to number of predictors, relative to previous studies (Roberts et al., 2012). Both golfers (*n* = 86) and archers (*n*= 69) were recruited as previous research has reported that the yips are particularly prevalent in both these sports (chapter two, chapter three). All participants were a) aged 18 or older and b) either an archer who competed at county level or a golfer with a handicap of 15 or below. Recruitment for the study was obtained using opportunity sampling by contacting governing bodies (*who want to remain anonymous), using personal contacts within sport (sending emails with links to online study) and through social media (Facebook and twitter).

4.2.2 Ethics

This research complied with The British Psychological Society's ethical guidelines (BPS, 2009; 2010; 2013) and ethical approval was obtained from the Sport and Exercise Research Ethics Committee (Ethic approval Number: SPORTX_1314_04) at the University of Derby.

4.2.3 Online Methods

The internet offers the potential to recruit or disseminate psychology studies to a broad audience in an accessible manner (Mitchell, Stanimirovic, Klein, & Vella-Brodrick, 2009). This approach also allows easier access to a wider range of participants whilst maintaining anonymity and it can be accessed at a person's own convenience, without the need for human interaction (Mitchell et al., 2010). Due to the constraints associated with accessing a skilled level sample, using online methods is an effective method to aid recruitment (Lonsdale, Hodge, & Rose, 2006). Lonsdale et al. (2006) reported no significant difference between online scores and paper scores for sport psychology measures. Interestingly, online methods meant surveys were returned faster, and with less missing data. Consequently, this study has used Qualtrics software to create and collate the questionnaire data.

4.2.4 Design

A 2 x 2 x 2 independent design was employed to explore the role of fear of negative evaluation, anxiety sensitivity, perfectionism, perfectionism self-presentation, self-consciousness and individual differences between yips (yips-affected and unaffected) and choking (choking-affected and unaffected) across two sports (Golf and Archery).

4.2.5 Measures

Questionnaires measured fear of negative evaluation, anxiety sensitivity, perfectionism, perfectionism self-presentation, self-consciousness, individual differences and perceived control using an online survey tool (www.qualtircs.com). The Cronbach's alpha for the current study and previous studies are detailed (See table 4.1). All measures reported a similar Cronbach's alpha to previous literature unless otherwise stated, which can be seen in Table. 4.1.

Brief Fear of Negative Evaluation-II (BFNE-II: Carleton, McCreary, Norton, & Asmundson, 2006; Rodebaugh et al., 2004: See Appendix D) is a shorter version of the brief FNE questionnaire (BFNE: Leary, 1983). The BFNE is a shortened version of the original FNE (Watson & Friend, 1969) that measures an individual's tolerance for the possibility they may be judged despairingly or with hostility by others (e.g., *"I worry about what other people will think of me even when I know it doesn't make any difference*). The BFNE-II has undergone psychometric testing and has acceptable psychometric properties almost identical to the original FNE scale (See Table 4.1: Carleton et al., 2006; Leary, 1983; Waston & Friend, 1969). The scale consists of 12 items rated on a five point Likert scale ranging from 0 (not at all characteristic of me) to 4 (extremely characteristic of me).

Anxiety Sensitivity Index-III (ASI-III: Taylor et al., 2007: See Appendix E) is an 18-item version of the original ASI (Reiss, Peterson, Gursky, McNally, 1986) that measures fear of physical, cognitive and social domains of anxiety on a five point Likert scale from 0 (very little) to 4 (very much). Six items measured fear of physical symptoms (e.g., *"It scares me when me when my heart beats rapidly"*), six items measured fear of cognitive control (e.g., *"it scares me when I am unable to keep my mind on a task"*) and the final six items measured fears of social concerns (e.g., *"it is important for me not to appear nervous*"). The measure has exhibited excellent psychometric properties including reliability (See Table 4.1; Taylor et al., 2007).

Multidimensional Perfectionism Scale (FMPS: Frost et al., 1990: See Appendix F). The shortened version of the FMPS (Cox et al., 2002) was used in the current study. This shortened version has shown improved psychometric qualities from the original scale (See table 4.1: Cox et al., 2002). The shortened FMPS is a 22-item questionnaire that assesses five dimensions of perfectionism on a five point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The five dimensions measured included: concern over mistakes (COM five items: e.g., *"If I fail partly, it is as bad as being a complete failure*"); organisation (ORG four items: e.g., *"I am a* *nest person"*), personal standards (PS five items: e.g., "*It is important to me that I be thoroughly competent in everything I do*"); parental pressures which is a combination of parental expectation and parental pressures from the original Frost et al. scale (PP five items: e.g., " *I never felt like I could meet my parents expectations*"); and doubts about action (DAA three items: e.g., "*Even when I do something very carefully, I often feel that it is not quite right"*).

Perfectionism Self-Presentation Scale (PSPS: Hewitt et al., 2003: See Appendix G) is a 27-item multidimensional scale that evaluates an individual's need to appear perfect to others on a seven point Likert scale from 1 (disagree strongly) to 7 (agree strongly). The scale consists of three subscales: perfectionistic self-promotion which assess the need to appear perfect to others (10 items: e.g., "*I try always to present a picture of perfection*"); non-display of imperfection which assess the need to avoid looking imperfect to others (10 items: e.g., "*I judge myself based on the mistakes I make in front of people*"); and non-disclosure of imperfection which asses the need to avoid revealing imperfections to others (Seven items: "*It is okay to show others I am not perfect*"). The scale showed good psychometric qualities (See Table 4.1: Hewitt et al., 2003).

Self-Consciousness Scale (SCS, Fenignstein et al., 1975: See Appendix H) is a 23-item questionnaire that measures dispositional self-consciousness on a five point Likert scale from 0 (extremely uncharacteristic) to 4 (extremely characteristics). The scale consists of three subscales: private self-consciousness (10 items: e.g., "*I'm always trying to figure myself out*"); public self-consciousness (seven items: e.g., "*I'm concerned about my style of doing things*"); and social anxiety (six items: e.g., "*It takes me time to overcome my shyness in new situations*"). The scale has demonstrated adequate psychometric qualities (See Table 4.1: Fenignstein et al., 1975).

The Big-Five Inventory-10 (BFI-10: Rammstedt & John, 2007: See Appendix I) is a shortened version of the well-established Big-Five inventory (BFI: John et al., 1991) that consists of 44 items assessed on a 5 point Likert scale from 1 (disagree strongly) to 5 (agree strongly). The BFI-10 assesses the big-five characteristics: extraversion (two items: e.g., "I *see myself as someone who is outgoing, sociable*"); agreeableness (two items: e.g., "*I see myself as someone who is generally trusting*"); conscientious (two items: e.g., "*I see myself as someone who does a* *thorough job*"); neuroticism (two items: e.g., "*I see myself as someone who gets nervous easily*"); and openness to experiences (two items: e.g., "*I see myself as someone who has an active imagination*"). The BFI-10 showed good psychometric qualities and had better test-retest reliability than other 10 item personality measures (Rammstedt & John, 2007). Whilst, the current study reported a Cronbach's Alpha score similar to previous literature for neuroticism, conscientiousness and extraversion, the subscales for agreeableness and openness were not reliable (See table 4.1). Even so, scores are presented in the analyses but are interpreted with caution.

Perceived Control over Stressful Events Scale (PCOSES: Frazier, Keenan, Anders, Perera, Shallcross, & Hintz, 2011: See Appendix J) is a 17-item measure designated to assess past, present and future control over stressful situations. Each item was measured on a 4-point Likert scale (1 = strongly disagree to 4 = strongly agree) with nine reverse scored questions. Five items measure past experiences (e.g., *"I could have done something to prevent this event from happening"*), nine items measure present experiences (e.g., *"There isn't much I can do to help myself feel better about the event"*) and the final four items measure future control (e.g., *I can do things to make sure I will not experience a similar event in the future"*). This scale has undergone and provided good psychometric testing (Frazier et al., 2011). The current study reported a Cronbach's Alpha score similar to previous literature for future control. However, past and present control were not reliable variables (See table 4.1). Even so, scores are presented in the analyses but are interpreted with caution.

Demographics were collated via a form created to collect data on gender, age, level of competition (school/university, club, county, national, international), handicap (for golf only) and time spent at each level.

Choking demographic information was recorded via a self-report measure that identified if the participants "*had ever experienced a dramatic drop in performance that had been out of their control".* Those who identified yes, then identified what symptoms they experienced. This included a number of physiological and psychological symptoms including: jerks; tremors; spasms; freezing; uncontrollable movement of limbs; loss of control of limbs; loss of precision; sweating; butterflies; jittery; self-consciousness; can't control thought process; nervous and anxious; can’t focus; unable to make a decision; threatening; increased negativity; self-critical; and can’t control emotions. This symptom checklist was created based on the findings from previous literature, chapter two and three.

Yips demographic information was recorded via a self-report measure which identified if the participants had ever experienced the yips (golf) or target-panic (archery). Those who identified yes, then identified what symptoms they experienced. This included a number of physiological and psychological symptoms including; jerks; tremors; spasms; freezing; uncontrollable movement of limbs; loss of control of limbs; loss of precision; sweating; butterflies; jittery; self-consciousness; can’t control thought process; nervous and anxious; can’t focus; unable to make a decision; threatening; increased negativity; self-critical; and can’t control emotions. Those in the yips group identified yes on this scale and answered a number of yips specific questions such as: severity of the yips on performance; aspect of the game affected (golf); bow affected (archery); how long they had suffered with symptoms; are they currently suffering, and when was their last experience of the yips. This symptom checklist was created based on the findings from previous literature, chapter two and three.

4.2.6 Procedure

If the participant was interested in taking part in the study they clicked on the online link that was hosted by www.qualtrics.com. Participants were then presented with the study information sheet (See Appendix K) and a series of questions regarding informed consent and the right to withdraw. Upon providing consent the participant created a unique identifying code (made up of three letters and three digits) which allowed for their data to be identified if they wished to withdraw. Then six of the questionnaires were presented in a randomised order (BFNE, ASI-II, SCS, BFI-10, PSPS and the FMPS), followed by the choking and yips specific questions respectively. If the participant answered no to “Have you ever experienced the yips”, they were directed to the final debrief page. If they answered yes, they completed the yips specific questions followed by the PCOSES questionnaire. The final debrief page (See Appendix L) provided further detail regarding the study and restated the right to withdraw. The participants were also provided with a link and contact details for support (Health Care Professionals Council) if they were affected by completing the questionnaire.

4.2.7 Analysis

Data was analysed using SPSS version 22. The continuous variables were tested for normality using their histograms, the Kolmogorov-Smirnov and Shapiro-Wilk test. To explore the differences in scores of fear of negative evaluation, anxiety sensitivity, perfectionism, perfectionism self-presentation, self-consciousness and individual differences between those participants in the yips, choking and control groups, and between archery and golf, a 2 x 2 x 2 MANOVA was employed. In order to test which variables best predicted yips and choking behaviour, discriminant function analyses were conducted (Field, 2013). Within the yips group, a correlational analysis was conducted to observe the relationships between yips severity, length of time suffering with the variables, perceived control and yips type. All tests were two-tailed with an alpha set at 0.05.

Table 4.1:

Cronbach's alpha scores for the current study and previous studies

Characteristic	Current Cronbach's α	Previous Reported Cronbach's α
Fear of negative evaluation (BFNE-II)	.97	.97
Neuroticism (BFI-10)	.55	.74
Extraversion (BFI-10)	.69	.83
Agreeableness (BFI-10)	-.11	.68
Conscientious (BFI-10)	.55	.77
Openness (BFI-10)	.02	.72
Private self-consciousness (SCS)	.65	.79
Public self-consciousness (SCS)	.85	.84
Social anxiety (SCS)	.88	.73

Physical concerns (ASI-III)	.90	.79
Cognitive concerns (ASI-III)	.93	.84
Social Concerns (ASI-III)	.84	.79
Non display of imperfection (PSPS)	.86	.83
Non-disclosure of imperfection (PSPS)	.41	.78
Perfectionistic self-promotion (PSPS)	.79	.86
Concern over Mistakes (FMPS)	.86	.86
Organisation (FMPS)	.83	.90
Personal standards (FMPS)	.79	.85
Parental expectations (FMPS)	.85	.84
Doubts about actions (FMPS)	.65	.63
Past Control (PCOSES)	.01	.89
Present Control (PCOSES)	.33	.79
Future Control (PCOSES)	-.49	.88

4.3. Results

The results are divided into five sections: preliminary analysis; main analyses between groups, analysis of two predictive models, analysis of symptoms, and finally the yips.

4.3.1 Section one: Preliminary analyses Demographics

The majority of the scales used in the current study were classed as reliable ($C\alpha > .5$; George & Mallery, 2003) based on Cronbach's Alpha test (See table 4.1). There were issues with reliability for the subscales of agreeableness, openness, non-disclosure of imperfection, past control, present control and future control. A preliminary analysis revealed that the yips group was not homogeneous; there were significant differences in a number of variables between those yips-affected athletes who experienced choking and those who did not. This section will look to partially address aim two of the current study by reporting the participant demographics. Fifty-four participants' gender and age were not recorded due to errors with the online software; the remaining 101 athletes' scores were then used in the analysis for gender and age.

4.3.1.1 Choking

The following are the mean scores for each of the choking groups: yes (n=64; Mage = 45.41, SD = 13.83) and no (n=37; Mage = 42.49, SD =14.07). The number of males and females in each group were as follows: yes (male: n = 49; female: n = 15) and no (male: n = 29; female: n = 8). Therefore 78% of the sample was male and the remaining 23% was female. A Mann-Whitney test indicated that there was no significant difference in age between the two groups U = 1039, p = .307. The handicap of the golfers in each of the groups were: yes (n= 53, M handicap= 8.14, SD = 4.89) and no (n= 33, M handicap= 10.08, SD = 5.28). A Mann-Whitney test indicated that there was no significant difference in handicap between the two groups U= 671.5, p = .071. For choking the prevalence rate were 67.7% for both sports, with specific rates of 75.4% and 61.6% for archery and golf respectively. The findings for length of time at top level and the range of athlete's competitive level can be found in Appendix M.

4.3.1.2 Yips

The following are the mean scores for each yips group: yes (n=37; Mage = 42.41, SD= 12.93) and no (n=64; Mage = 45.45, SD= 14.44). The number of males and females in each group were as follows: yes (male: n = 29; female: n = 8) and no (male: n = 49; female: n = 15). Therefore 78% of the sample was male and the remaining 22% was female. A Mann-Whitney test indicated that there was no significant difference in age between the two groups U = 1022, p = .253. A Mann-Whitney test indicated that there was no significant difference in handicap between the two groups U = 829, p = .832. The handicap of the golfers in each of the group were: yes (n= 31, M handicap= 8.9, SD = 5.28) and no (n= 55, M handicap= 8.87, SD = 5.05). For yips the prevalence rate were 39.4% for both sports, with specific rates of 36% and 43.5% for golf and archery respectively. The findings for length of time at top level and the range of athlete's competitive level can be found in Appendix M.

4.3.2 Section Two: Main analyses between groups

This section reports the statistical analyses associated with aim one of the study. A 2 (Choking = Yes & No) x 2 (Yips = Yes & No) x 2 (Sport= Golf & Archery) MANOVA examined main effects and interactions between these independent variables (IVs) and 20 dependant variables (DV's; subscales of BFNE, BFI-10, SCS, ASI, PSPS and FMPS). The results showed that there was a significant multivariate main effect for choking $F\,(20, 128) = 2.55$, $p = 0.001$, Wilk's $\lambda = 0.76$, partial $\eta^2 = .28$, and for sport $F\,(20, 128) = 2.72$, $p < 0.001$, Wilk's $\lambda = 0.70$, partial $\eta^2 = .3$. There was a near significant main effect for yips $F\,(20, 128) = 1.62$, $p = 0.06$, Wilk's $\lambda = 0.8$, partial $\eta^2 = .20$. There were no significant interactions for choking and yips $F\,(20, 128) = .54$, $p = 0.94$, Wilk's $\lambda = 0.92$, partial $\eta^2 = .08$; choking and sport $F\,(20, 128) = .87$, $p = 0.62$, Wilk's $\lambda = 0.88$, partial $\eta^2 = .12$; yips and sport $F\,(20, 128) = 1.53$, $p = 0.08$, Wilk's $\lambda = 0.81$, partial $\eta^2 = .19$; and choking, yips and sport $F\,(20, 128) = 1.34$, $p = 0.16$, Wilk's $\lambda = 0.83$, partial $\eta^2 = .17$.

4.3.2.1 Choking

Univariate analyses revealed that there was a significant difference between those who were choking-affected and those who were not, on 10 of the 20 variables. Table 4.2 details the means, standard deviation, F value and partial η^2 for each variable. Those who experienced choking reported significantly higher scores for: physical concerns; cognitive concerns; social concerns; fear of negative evaluation; private self-consciousness; non-display of imperfection; concern over mistakes; parental expectations; and doubts about actions and significantly lower levels of conscientiousness.

4.3.2.2 Yips

Univariate analyses revealed significant effects for four of the 20 variables between those who were yips-affected and those who were not. Table 4.2 details the means, standard deviation, F value and partial η^2 for each variable. Those who experienced the yips reported significantly higher scores for: social anxiety; non-display of imperfection; and perfectionistic self-promotion and significantly lower scores for conscientiousness.

4.3.2.3 Sport

Univariate analyses revealed that experiencing choking has a statistically significant effect on nine of the 20 variables. Table 4.2 details *F* value and partial η^2 for each variable. Golfers reported significantly higher scores for: physical concerns; cognitive concerns; fear of negative evaluation; extraversion; public self-consciousness; social anxiety; non-display of imperfection; non-disclosure of imperfection; and perfectionistic self-promotion.

Table 4.2:

Total Mean, SD, F value, Partial η2 for each variable for both yips and choking groups

		Choking				Yips					
		Yes	No	Choking		Yes	No	Yips		Sport	
Variable	Sport	Means (SD)		*F* value	Partial η^2	Means (SD)		*F* value	Partial η^2	*F* value	Partial η^2
Fear of negative evaluation (BFNE-II)	*Archery*	37.44 (12.2)	31.6 (15.09)	10.63***	0.07	35.17 (13.23)	35.21 (13.14)	0.56	0.004	6.95**	0.05
	Golf	40.58 (12.82)	34 (14.48)			43.35 (12.26)	35.84 (13.5)				
	Total	39.03 (12.56)	33. 27 (14.45)			39.32 (13.3)	35.57 (13.28)				
Neuroticism (BFI-10)	*Archery*	2.62 (1.02)	2.29 (.77)	3.33	0.02	2.72 (.8)	2.4 (1.07)	2.48	0.02	2.49	0.02
	Golf	2.86 (1.07)	2.58 (.90)			3.02 (.9)	2.6 (1.05)				
	Total	2.74 (1.05)	2.48 (.86)			2.87 (.86)	2.52 (1.06)				
Extraversion (BFI-10)	*Archery*	3 (1.3)	2.91 (1.19)	1.27	0.01	3.02 (1.1)	2.95 (1.18)	0.101	0.01	6.81**	0.04
	Golf	3.24 (.86)	3.79 (.97)			3.27 (.88)	3.54 (.96)				
	Total	3.11 (1.01)	3.49 (1.12)			3.15 (1)	3.29 (1.09)				
Agreeableness (BFI-10)	*Archery*	3.44 (.81)	3.38 (.63)	0.11	0.001	3.37 (.82)	3.47 (.73)	0.22	0.001	0.03	0
	Golf	3.4 (.7)	3.48 (.77)			3.34 (.64)	3.48 (.76)				
	Total	3.42 (.75)	3.45 (.72)			3.35 (.73)	3.48 (.75)				
Conscientiousness (BFI-10)	*Archery*	3.8 (.9)	4.38 (.65)	10.74***	0.07	3.92 (.98)	3.96 (.8)	10.74***	0.07	0.857	0.01
	Golf	3.89 (.86)	4.24 (.72)			3.53 (.77)	4.3 (.72)				
	Total	3.84 (.88)	4.29 (.69)			3.72 (.9)	4.16 (.77)				
Openness (BFI-10)	*Archery*	3.65 (.88)	3.56 (1.08)	0.33	0.002	3.37 (.86)	3.82 (.86)	1.923	0.01	1.74	0.01
	Golf	3.43 (.84)	3.27 (.84)			3.32 (.87)	3.4 (.83)				
	Total	3.54 (.87)	3.37 (.93)			3.34 (.86)	3.57 (.9)				
Private Self-Consciousness (SCS)	*Archery*	3.7 (.55)	2.62 (.45)	13.67***	0.09	2.92 (.53)	2.98 (.58)	0.341	0.002	3.32	0.02
	Golf	3.11 (.56)	2.84 (.45)			3.18 (.62)	2.91 (.46)				
	Total	3.09 (.56)	2.77 (.46)			3.05 (.58)	2.94 (.52)				
Public Self-Consciousness (SCS)	*Archery*	3.08 (.88)	2.66 (.91)	1.93	0.02	2.97 (.9)	2.98 (.92)	1.192	0.01	13.7***	0.09
	Golf	3.43 (78)	3.32 (.85)			3.65 (.79)	3.23 (.78)				
	Total	3.25 (.84)	3.09 (.92)			3.32 (.90)	3.13 (.84)				
Social Anxiety (SCS)	*Archery*	3.09 (.56)	2.96 (.66)	2.19	0.01	3.07 (.46)	3.05 (.67)	5.07*	0.03	5.45*	0.04
	Golf	3.33 (.75)	3.06 (.64)			3.6 (.65)	3.02 (.67)				

	Total	3.21 (.67)	3.03 (.64)			3.34 (.62)	3.03 (.67)				
Physical Concerns (ASI-III)	*Archery*	1.61 (.75)	1.38 (.46)	9.39**	0.06	1.4 (.38)	1.68 (.85)	0.474	0.003	11.76***	0.07
	Golf	2.19 (.97)	1.7 (.79)			2.38 (.12)	1.79 (.8)				
	Total	1.90 (.9)	1.59 (.71)			1.9 (.92)	1.74 (.82)				
Cognitive Concerns (ASI-III)	*Archery*	1.62 (.97)	1.26 (.35)	12.73***	0.08	1.41 (.48)	1.62 (1.06)	2.448	0.016	13.4***	0.08
	Golf	2.24 (.95)	1.59 (.68)			2.48 (1.06)	1.71 (.68)				
	Total	1.93 (1)	1.48 (.61)			1.96 (.98)	1.68 (.86)				
Social Concerns (ASI-III)	*Archery*	2.53 (.92)	2.28 (.95)	5.01*	0.03	2.25 (.87)	2.64 (.94)	0.09	0.001	2.95	0.02
	Golf	2.83 (.94)	2.4 (85)			2.96 (.81)	2.5 (.95)				
	Total	2.68 (.94)	2.36 (.88)			2.61 (.91)	2.56 (.95)				
Non-Display of Imperfection (PSPS)	*Archery*	3.76 (1.15)	3.28 (1.26)	7.5**	0.05	3.82 (1.13)	3.51 (1.23)	6.73**	0.04	9.03**	0.06
	Golf	4.27 (1.08)	3.61 (1.08)			4.66 (1.16)	3.66 (.93)				
	Total	4.02 (1.14)	3.5 (1.14)			4.25 (1.21)	3.6 (1.06)				
Non-Disclosure of Imperfection (PSPS)	*Archery*	4.06 (.79)	3.77 (.78)	1.24	0.01	3.94 (.87)	4.02 (.74)	3.353	0.02	9.45**	0.06
	Golf	4.25 (.77)	4.16 (.72)			4.63 (.76)	3.98 (.63)				
	Total	4.16 (.78)	4.03 (.75)			4.29 (.88)	4 (.67)				
Perfectionistic Self-Promotion (PSPs)	*Archery*	3.94 (1.02)	3.68 (.92)	2.429	0.02	3.97 (.92)	3.8 (1.05)	6.44*	0.04	5.1*	0.03
	Golf	4.2 (1.01)	3.91 (.86)			4.67 (.9)	3.76 (.84)				
	Total	4.07 (1.02)	3.83 (.88)			4.32 (.97)	3.78 (.93)				
Concern Over Mistakes (FMPS)	*Archery*	2.47 (1.11)	1.89 (1.02)	10.57***	0.07	2.44 (1.1)	2.24 (1.12)	2.23	0.02	1.27	0.01
	Golf	2.53 (.87)	2.04 (.73)			2.73 (.79)	2.11 (.8)				
	Total	2.48 (.99)	1.99 (.83)			2.59 (.96)	2.17 (.94)				
Organisation (FMPS)	*Archery*	3.26 (.88)	3.44 (.72)	1.61	0.01	3.3 (.91)	3.31 (.8)	2.1	0.14	3.5	0.02
	Golf	3.59 (.85)	3.59 (.85)			3.38 (.78)	3.88 (.84)				
	Total	3.43 (.88)	3.43 (.88)			3.34 (.84)	3.65 (.87)				
Personal Standards (FMPS)	*Archery*	3.68 (.84)	3.71 (.66)	0.12	0.001	3.7 (.75)	3.67 (.83)	0	0	0.07	0
	Golf	3.63 (.81)	3.65 (.65)			3.6 (.73)	3.65 (.77)				
	Total	3.65 (.82)	3.67 (.65)			3.65 (.74)	3.66 (.79)				
	Archery	2.32 (1.03)	1.86 (.85)	9.9**	0.06	2.17 (.99)	2.23 (1.02)	2.71	0.02	0.2	0.001

Parental Expectations (FMPS)	*Golf*	2.38 (.91)	1.76 (.84)			2.59 (.98)	1.89 (.8)				
	Total	2.35 (.96)	1.8 (.83)			2.39 (1)	2.03 (.91)				
Doubts About Action(FMPS)	*Archery*	2.78 (.58)	2.25 (.88)	6.57*	0.04	2.63 (.69)	2.5 (.96)	2.96	0.02	1.74	0.01
	Golf	3.08 (.77)	2.35 (1.02)			2.98 (.85)	2.44 (.90)				
	Total	2.92 (.69)	2.32 (.96)			2.81 (.79)	2.46 (.92)				

*Significant at the 0.05 level ** Significant at the 0.01 level *** Significant at $p < 0.001$ level.

4.3.3 Section Three: Analyses of two predictive models

4.3.3.1 Choking

A discriminant function analysis was conducted to test if the significant variables revealed in the MANOVA could act as predictors for whether an individual chokes or not. This predictive model included the 10 variables reported in section two: physical concerns, cognitive concerns, social concerns, fear of negative evaluation, conscientiousness, private self-consciousness, non-display of imperfection, concern over mistakes, parental expectations and doubts about actions, which revealed one discriminant function. This function explained 100% of variance, canonical $R^2 = .41$, and significantly differentiated the groups, $\lambda = .83$, $X^2_{(2)} = 27.32$, $p = 0.002$ (See Appendix M for full detail on how the model was loaded). Conscientiousness and private self-consciousness were the largest contributors to the model. This model was able to predict 71% of the original sample successfully into correct groups.

4.3.3.2 Yips

A discriminant function analysis was conducted to test if the significant variables revealed in the MANOVA could act as predictors for whether an individual experiences the yips or not. This predictive model included the four variables reported in section two: conscientiousness, social anxiety, non-display of imperfection and perfectionistic self-promotion, which revealed one discriminant function. This function explained 100% of variance, canonical $R^2 = .37$, and significantly differentiated the groups, $\lambda = .87$, $X^2_{(2)} = 21.57$, $p = 0.002$. (See Appendix M for full detail on how the model was loaded). Conscientiousness and perfectionistic self-promotion were the largest contributors to the model. This model was able to predict 69% of the original sample successfully into correct groups.

4.3.4 Section four: Symptoms

4.3.4.1 Symptoms and Yips Type

This section reports the statistical analyses associated with aim two of the study. Based on the symptoms reported, athletes were divided into one of the three yips subgroups highlighted from the two dimensional yips model (Clarke et al., chapter two; Smith et al, 2003) which is reported in table 4.3 below; type-I ($n = 7$), type-II ($n = 6$) and type-III ($n = 45$). Three athletes did not report any symptoms they experienced on the checklist and therefore only 58 were included in this sample. The most commonly experienced physical symptoms were loss of control of limbs (*n* = 28) and loss of precision (*n* = 26). The most frequently experienced psychological symptoms were self-consciousness (*n* = 32), nerves and anxiety (*n* = 32), increased negativity (*n* = 37) and being self-critical (*n* = 31). A Chi Square test of independence revealed an association between sport and yips type X^2 (2, *n*=59) = 9.79, *p* = 0.007. As seen in table 4.3 the breakdown of sports highlighted that no golfers were type-I, 10% experienced type-II (*n* = 3) and 90% experienced type-III (*n* = 27). For archery, 27.6% experienced type-I, 10.3% experienced type-II and 62.1% experienced type-III. A Chi square test of independence revealed an association between yips-type and symptoms experienced for 11 symptoms including: jerks; uncontrollable movement of limbs; loss of control of limbs; loss of precision; jittery; self-conscious; can't control thought process; nerves and anxiety; cannot focus; increased negativity and self-critical. Those who experienced both psychological and physiological symptoms were more likely to experience all the symptoms. See Appendix M for a more detailed results on the symptoms data.

Table 4.3:

Shows the breakdown of athletes in all three yips-subgroups based on symptoms

	Yips type			
Sport	Type-I	Type-II	Type-III	Total
Archery	7	3	18	28
Golf	0	3	27	30
Total	7	6	45	58

4.3.5 Section Five: The Yips

4.3.5.1 Demographics

This section reports the statistical analyses associated with aim three of the study. Twenty-four yips-affected participants' gender and age were not recorded (See table 4.14). The remaining sample included 29 males (golf: *n* = 25, archery: *n* = 4) and eight females (golf: *n* = 6, archery: *n* = 2). An analysis of variance showed that there was not a significant difference for age between the groups (type-I, type-II & type-III; *F* (2, 34) = .954, *p* = .395). To investigate the differences in the severity of symptoms experienced by the three groups, a Kruskal-Wallis test was conducted (due to issues with normality). The findings showed there was a significant difference in severity of yips (0= low; 10= high) symptoms between the yips types X^2 (2, *n* =59)

= 14.66, p = 0.001 with 4.50 (SD = 2) for the type-I group, 5.33 (SD = 2.66) for the type-II group and 7.84 (SD =2.02) for the type-III. A post-hoc analysis showed that type-III was significantly different to type-I $p<0.001$ and type-II $p= 0.02$. Finally, in order to investigate if there were differences between the yips type and the time suffering with the symptoms, a Kruskal-Wallis test was conducted (due to issues with normality), revealing that there were no significant differences between the groups X^2 (2, n =57) = 3.83, p = 0.15. As seen the G*power analysis this analysis was underpowered and so caution should be warranted when interpreting these findings. Consequently, the remaining results on the yips sub group data can be found in Appendix M.

4.4 Discussion

The role of personality traits in predicting the likelihood of those who experience paradoxical performance is something that is gaining popularity in recent research (Bennett et al., 2016), yet the research is still in its infancy. As such, the primary aim of the current study was to investigate whether individual differences could predict if individuals were more likely to experience choking or the yips. It was hypothesised that a number of social, anxiety and perfectionism variables would be significantly higher in those who experienced choking and the yips (See figures 4.2 and 4.3). Within the choking group, there was partial support for the hypothesis as four social variables, two anxiety variables and three perfectionism variables were significantly higher, and one social variable (conscientiousness) was significantly lower, in those choking-affected athletes compared to those unaffected (see figure 4.4). A discriminant function analysis revealed that together these 10 factors predict 71% of the original sample correctly, with conscientiousness and private self-consciousness as the largest contributors to the Choking Predictive Model (CPM). Whereas, within the yips group, the findings partially supported the hypothesis, with three social variables (perfectionistic self-promotion, social anxiety and non-display of imperfection) were significantly higher, and one social variable (conscientiousness) significantly lower, in those yips-affected athletes compared to their unaffected counterparts. Discriminant function analysis revealed that these four factors could predict 69% of the original sample correctly, with conscientiousness and perfectionistic self-promotion as the largest contributors to the Yips Predictive Model (YPM). This is the first study, to the authors knowledge, that investigates a range of anxiety, social and perfectionism factors collectively and the largest sample size investigating paradoxical performances (Geukes et al., 2012; Mesgano et al., 2012; Roberts et al. 2013).

Throughout this section the findings for the CPM and the YPM models will be discussed respectively, addressing aim one. Next, the section will cover aim two's findings, addressing the demographics and symptoms of those yips-affected and unaffected athletes and those choking-affected and unaffected. Finally, the findings associated with testing the yips two-dimensional model in relation to aim three will be discussed. All of these sections will discuss how the present study's findings extend the current thinking on yips and choking.

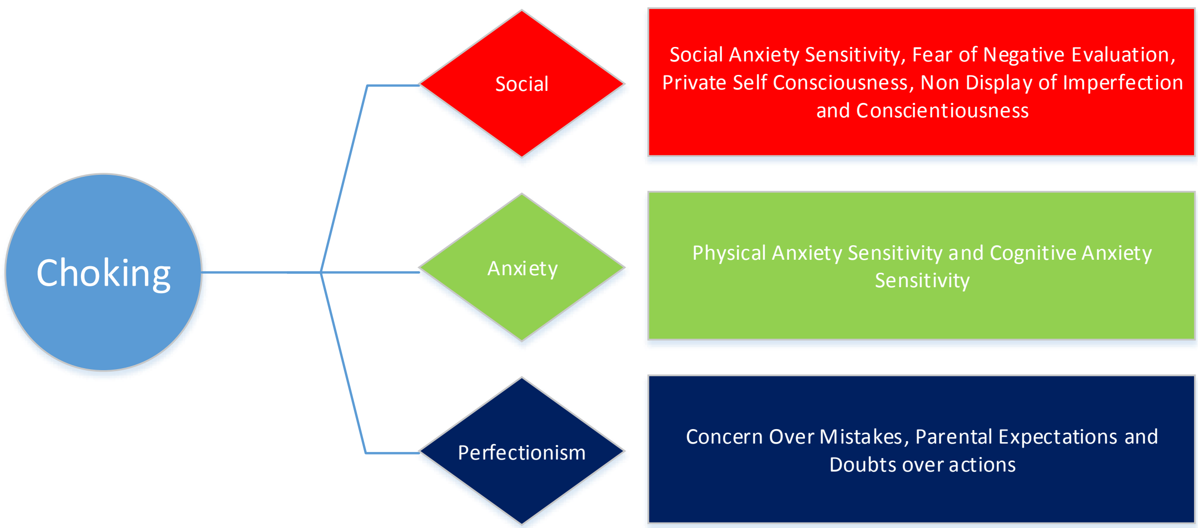

Figure 4-3: *The CPM*

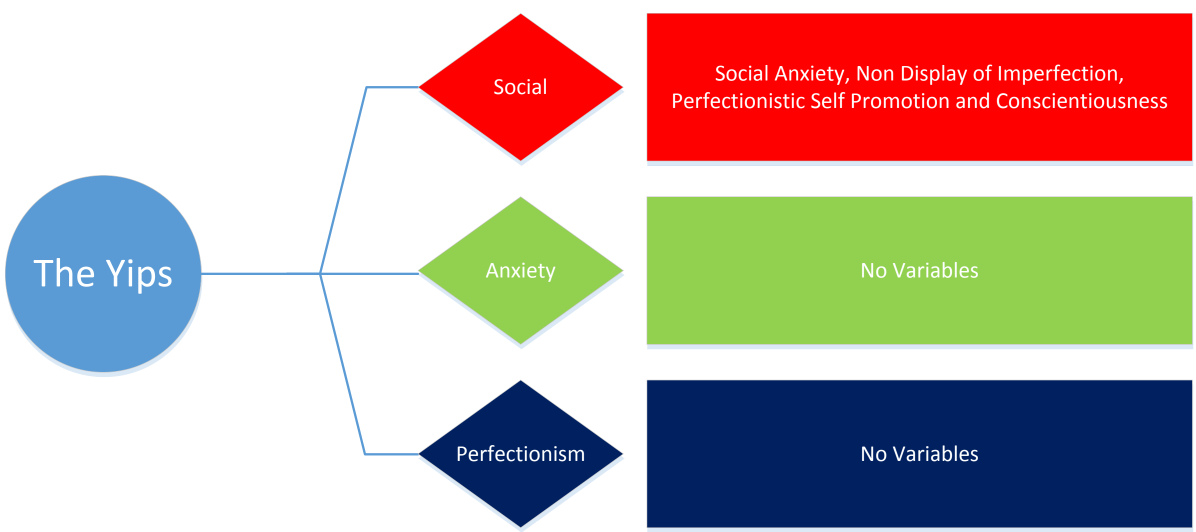

Figure 4-4: *The YPM*

4.4.1 Choking Predictive Model (CPM)

The current findings illustrated that higher levels of anxiety sensitivity originating from physical, cognitive and social sources are exhibited in choking-affected athletes. This is the first study to investigate anxiety using a trait measure of sensitivity or interpretation. It is well documented within the choking literature that anxiety is a consistent factor within choking, yet its exact role is unclear (Geukes et al., 2012; Hill et al., 2010; Guiccardi et al., 2010). Research has already suggested that high levels of trait anxiety can induce a choking experience (Baumesiter & Showers, 1986; Masters et al., 1993; Wilson, 2008), yet this is not to say that individuals with low levels of trait anxiety will not experience a choke. The current findings support qualitative accounts of choking (Chapter 3, Guiccardi et al., 2010; Hill et al., 2010), which suggest that athletes' sensitivity to changes in bodily cues, such as cognitive and somatic arousal, may provide greater insight into the anxiety-performance relationship than intensity alone. As such, Schmidt et al. (1997) discussed that misinterpretation of bodily cues can result in a negative cycle, when athletes, as a fearful response to an increase in arousal, exhibit increases in anxiety that constitute the focus of apprehension. Anxiety sensitivity refers to the fear of anxiety related sensations and the associated negative consequences (Deacon, Abramowitz, Woods, & Tolin, 2002). Of interest, the Directional Interpretation Hypothesis (Jones & Hanton, 1991) identifies that interpretation of anxiety symptoms may be more important than intensity of anxiety symptoms on performance, particularly cognitive anxiety interpretation (Butt et al., 2003). Thus, individuals who experience higher fear of anxiety-related sensations are more likely to interpret arousal negatively. This is of particular interest, as Attentional Control Theory (Eysenck & Derakshan, 2011) suggests that if the finite attentional resources are consumed by irrelevant cues (i.e., cognitive anxiety), a deterioration in performance is likely to occur, as athletes do not address key performance cues. As such, future research should further investigate the influence of both anxiety interpretation and sensitivity on specific biomechanical, and psycho-physiological parameters (Cooke et al., 2010).

The role of social factors in the experience of choking was another key focus of the current study. The findings revealed that social anxiety concerns, fear of negative evaluation (FNE), private self-consciousness and non-display of imperfection were higher in those choking-affected athletes, highlighting further the role that factors related to self-consciousness play within the choking experience. These findings support recent experimental research which reported that higher private self-consciousness (self-focus) was reported in those who experienced choking (Geukes et al., 2013a; 2013b; Wang et al. 2004), but not public self-consciousness (Geukes et al., 2012a, 2012b; Wang et al., 2004). This proposal was partially supported within the current sample as there were no differences in public self-consciousness (distraction) between those who were choking-affected and those who were unaffected, suggesting that individuals who choke tend to internalise their focus.

Other sources of distraction self-consciousness, in the form of FNE and non-display of imperfection, were significantly higher in the choking group. These findings support Mesagno et al.'s (2011) suggestion that self-presentational concerns may be a potential origin for choking. Furthermore, Leary (1992) suggests that competitive anxiety revolves around self-presentational implications of competition. Both of these constructs involve athletes not wanting to be negatively evaluated by others (Mesagno et al., 2012) or not wanting others to see any imperfections in their performance (Hewitt et al., 2003). Therefore, it is possible that both self-focus and distraction forms of self-consciousness are integral components to the anxiety-performance relationship. This is particularly important as private self-consciousness could be explained by self-focus models of choking (Masters, 1992) as athletes focus their attention inwards to controlling movement, whereas, social forms of self-consciousness could be explained by distraction models of choking (Eysenck et al., 2007); as athletes fail to focus on key performance cues when they are distracted by irrelevant cues. This would support the assumption highlighted by Mesagno and Marchant (2013) who identified that self-focus and distraction models of choking could be investigated separately, whereby individuals high in trait measures of private self-consciousness would increase levels of self-focus during pressure environments. In addition, those who experience high trait levels of social self-consciousness may be predisposed to increase public self-awareness when experiencing pressure, and focus their attention on avoiding negative judgement or perceptions from the audience. Future research investigating these characteristics as an explanation for both self-focus and distraction models of choking is needed in studies that create different pressure environments.

Within the proposed CPM, athletes with higher levels of three perfectionism tendencies (concern over mistakes, parental expectation, doubts over actions) were more likely to experience choking. Research suggests that the subcomponents of Frost et al.'s (1990) model of perfectionism can be divided into two broad dimensions; (i) perfectionistic strivings, which includes individuals setting high personal standards and striving for perfection, and (ii) perfectionistic concerns which involves individuals being highly critical in self-evaluation (e.g., Dunkley et al., 2003; Stoeber & Otto, 2006). Furthermore, healthy perfectionists exhibit high levels of perfectionistic strivings and low levels of perfectionistic concerns, whereas unhealthy perfectionists display high levels of both perfectionistic concerns and strivings (Stoeber & Otto, 2006). Choking-affected athletes in the current study had an unhealthier perfectionism profile than those non-affected. Collectively, these findings support previous proposal that unhealthy perfectionists experience higher levels of FNE, anxiety and anxiety sensitivity than healthy perfectionists (Kawamura, Hunt, Frost, & DiBartolo, 2001; Koivula et al., 2002).

Individual differences were explored using the Big-Five personality model (McCrae & Costa, 2008; McCrae & John, 1992) including the factors of openness, extraversion, agreeableness, conscientiousness and neuroticism, but only conscientiousness was included in the CPM. Conscientiousness refers to when individuals are goal-directed, delay gratification and follows norms and rules (Roberts et al., 2009). This was the largest contributor and negative predictor within the CPM, which suggests that individuals who have not experienced choking would stick to, for example social norms. Byrne et al. (2015) reported inconclusive findings, measured with the BFI (John et al., 1991), concerning the role of conscientiousness in high and low-pressure environments. However, Woodman et al. (2010b) revealed that conscientiousness was positively associated with an athlete's quality of preparation in the lead up to competition. Thus, suggesting higher levels of conscientiousness related to greater competition preparation. This may indicate that individuals are more likely to choke when they do not effectively prepare for competition.

Levels of neuroticism were not different in choking-affected and non-affected athletes. This was unexpected as previous research has suggested a positive association between anxiety and neuroticism (Muris, Roelofs, Rassin, Franken, & Mayer, 2005) and that choking occurs under high levels of anxiety and pressure (Guicciardi et al., 2010; Hill et al., 2010a). In addition, Byrne et al. (2015) reported higher levels of neuroticism as a key predictor of poor performance under pressure in decision-making tasks. Yet caution is warranted when interpreting the current findings, as there were issues with reliability with the BFI-10 (Rammstedt & John, 2007) and the measure is a reduced item scale, with only two items per factor (Chen, Bollen, Paxton, Curran, &

Kirby, 2001). As such, further investigation using the BFI (John, Donahue, & Kentle, 1991) may provide greater insight into the role of conscientiousness and neuroticism within the choking experience.

The CPM included 10 components (as discussed above) and supported previous literature regarding the anxiety-performance relationship (e.g., Geukes et al., 2012a; Mesagno et al., 2012). This model also provides support for anxiety sensitivity as a strong potential predictor of choking, compared to intensity of anxiety. Furthermore, this model provides support for both private and social forms of self-consciousness as potential predictors of choking and mechanisms associated with both self-focus and distraction models of choking. Finally, the model also suggests that high levels of perfectionistic concerns and low levels of conscientiousness are associated with the experience of choking symptoms. Consequently, future research should aim to investigate these predictors and test the mechanisms directly on performance by creating a pressured environment investigating the influence on psycho-physiological, biomechanical and performance outcome measures. Thus, this will be investigated further in the next experimental chapter.

4.4.2 Yips Predictive Model (YPM)

The Yips Predictive Model (YPM) model proposed (see figure 4.5) that those who reported having the yips experienced significantly higher levels of social anxiety, non-display of imperfection and perfectionistic self-promotion, and significantly lower levels of conscientiousness than those who never experienced the yips. Like those who experienced choking, conscientiousness was found to be significantly lower in those who had experienced the yips compared to their unaffected counterparts. These four factors successful predicted 69% of the sample correctly, with conscientiousness and perfectionistic self-promotion as the two largest contributors to the model.

Conscientiousness was identified as being the largest contributor and negative predictor for those athletes experiencing the yips. This suggests that those individuals who try and refrain from acting within social norms, are less thorough, less careful and riskier, are more likely to experience the yips. This is the first time the big-five has been investigated using a yips sample. Interestingly, Kranick et al. (2011) reported significantly lower levels of conscientiousness in psychogenic movement disorders (PMD; clinical syndrome of abnormal movements, not explained by a medical disorder) when compared to healthy volunteers yet these findings were non-significant when co-varying for depression. It could be suggested that PMD are similar to type-III yips, as psychological factors are a supportive factor in diagnosing PMD (Williams, Ford, & Fahn, 1995). As Kranick et al. (2011) reported no difference between those who experienced focal hand dystonia and healthy volunteers, it could be argued that focal hand dystonia is similar to type-I yips, as individuals experience focal dystonia symptoms. The findings of this study also reported that conscientiousness was significantly lower in type-III athletes compared to type-I athletes. This finding supports the role of conscientiousness within the YPM but also the role it may play directly within the different yips classifications (type-I, type-II, type-III). As such, future research should investigate the role of depression and conscientiousness within the yips experience and different classifications of the yips.

The current findings did not support the hypothesis that neuroticism would be significantly higher in those yips-affected compared to those non-affected. However, when investigating the different yips classifications, neuroticism was significantly higher in type-III athletes compared to type-I athletes. No difference was witnessed between type-II athletes and type-I or type-III athletes. This suggests that neuroticism is significantly higher in those who experience both psychological and physical symptoms combined compared to those who experience just physical symptoms. This is unsurprising given that the psychological symptoms experienced from the checklist stem form sources of anxiety such as self-consciousness, intense nerves etc. However, as before, caution is necessary when interpreting both the neuroticism and conscientiousness findings as there were issues with reliability using the BFI-10 (Rammstedt & John, 2007) in the current study. Therefore, the role of neuroticism may still play a key role in understanding those who are susceptible to experience both forms paradoxical performance, yet a more reliable and robust measure of this should be utilised.

The final three characteristics (perfectionistic self-promotion, non-display of imperfection and social anxiety) that were included in the YPM were all significantly higher in those yips-affected athletes compared to those non-affected and focussed primarily on the self-presentation and impression management dimension. These findings support the key themes highlighted in chapter three. The strongest predictor of these factors was perfectionistic self-promotion, whereby, yips-affected athletes tried to project an image of fitting in perfectly with a social situation more than their unaffected counterparts (Fleet & Hewitt, 2014). Furthermore, the high levels of non-display of imperfection recorded show that yips-affected athletes defensively cover up mistakes more than those unaffected athletes. Fleet and Hewitt (2014) proposed an expanded model of perfectionism and social anxiety (see figure 4.6) suggesting that perfectionism factors such as perfectionistic self-presentation, perfectionistic rumination/mistake rumination and perfectionistic discrepancies act as a predictor of social anxiety. Hewitt et al. (2003) suggest that high levels of perfectionistic self-promotion, in combination with a desire to cover imperfections, may originate from a compensatory mechanism used to protect against a low or fragile sense of self-acceptance, and a sense of not belonging or not being accepted by others. This was particularly evident by the athletes in chapter three of this thesis, whereby, the archers discussed perceiving that they had to perform better than they were currently, because of the stature of the team they were on (i.e., making an Olympics team). Perfectionistic self-promotion and non-display of imperfection have been linked to social anxiety in a number of studies (Hewitt et al., 2003; Nepon et al., 2011). Furthermore, perfectionistic self-promotion, non-display of imperfection and non-disclosure of imperfection are robust predictors of daily social anxiety (Mackinnon, Battista, Sherry, & Stewart, 2014). Although non-disclosure of imperfection was not included in the current YPM, it was approaching significance within the analysis. Fleet, Besser and Hewitt (2014) also reported that those who experience higher levels of perfectionistic self-promotion experience a high need for validation, for example, a need to prove their sense of worth. Non-display of imperfection was also identified as a robust predictor of cluster C traits, which include anxiety, fear, avoidance and dependant traits (Sherry, Hewitt, Fleet, Lee-Baggley, & Hall, 2007). Furthermore, these self-presentational perfectionism concerns have also been linked with frequent intrusive automatic thoughts about the need to be perfect and thus increasing social anxiety (Sturman, 2011).

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Figure 4-5: *Fleet and Hewitt’s (2014) proposed model of Perfectionism and Social Anxiety*

Why and how individuals experience high levels of perfectionistic self-presentation is an area of research that needs investigating, particularly within sport. To date heightened anxiety sensitivity (Fleet, Greene, & Hewitt, 2004) and insecure attachment styles (Boone, 2013) have been highlighted as factors associated with high levels of perfectionistic self-presentation. Although the current study found no difference between both yips-affected and non-affected groups for anxiety sensitivity, it should be noted that both groups exhibited higher levels of social concerns compared to cognitive and somatic concerns. Furthermore, this is the first study to investigate the role of perfectionistic self-presentation within a sporting sample, and as such no comparisons can be made with other sporting literature on this topic. As such, further research on its role within paradoxical performance is warranted.

The YPM did not support the previous research conducted by Roberts et al. (2013) or Bennett et al. (2016) regarding trait multidimensional perfectionism (Frost et al., 1990) as a predictor of yips behaviour, as none of Frost et al.’s multidimensional perfectionism factors were significantly different between those yips-affected and those unaffected. Indeed, Roberts et al. recognise that the mean scores for doubts about actions, personal standards, organisation, and concern over mistakes for those yips-affected athletes were low compared to other studies investigating perfectionism. The means observed in the current study for the same perfectionism variables were indeed higher than those reported in the Roberts et al. study but were not significantly different to those non-affected athletes. These findings do support the findings of

Klampfl et al. (2013b) that there were no differences between those yips-affected and those not. However, we support Roberts et al.'s suggestion that future research should incorporate a sport specific measure of trait perfectionism to provide key insight into the role this plays in the experience of the yips.

In summary, it is proposed that the YPM provides novel insight into some key predictors of yips experience, particularly regarding the role of socially influenced factors such as perfectionistic self-presentation and social anxiety. This research has highlighted the need to further investigate the extended model of social anxiety proposed by Fleet and Hewitt (2014). Both the CPM and the YPM identify that both choking and yips affected athletes experience a number of similar factors such as the psychological symptoms (e.g., self-critical, intense nerves), yet the psychological predictors associated are subtly different. It is acknowledged however, that given the cross-sectional design utilised in the current study, conclusions about causality of both forms of paradoxical performance cannot be drawn, but the findings highlight these predictors increase the susceptibility of athletes to experience it. Consequently, it is not possible to conclude whether these psychological traits are psycho-reactive or pre-existent to the yips or choking experience. Therefore, future research needs to adopt both longitudinal and intervention based research aimed at specific traits in order to better understand these factors as potential causes or consequences of the yips and choking.

4.4.3 Demographics and Symptoms

The second aim of the current study was to provide detailed demographics of those who have experienced choking and the yips. The prevalence rate for the yips in the current study was 39.4%. The previous studies that have included prevalence rates have varied between 16% and 54% (Klampfl et al., 2014; McDaniels et al., 1989; Smith et al., 2003). Within the choking sample, the prevalence rate was recorded as 67.7%. This is the first study to the author's knowledge to report the prevalence rate for athletes who have experienced choking.

The findings revealed that there was no significant difference in age within the two groups within both forms of paradoxical performances (Choking: yes/no; Yips: yes/no). This is of particular interest for those experiencing the yips as it shows support to previous research that has identified no difference in age between those yips-affected and non-affected (see chapter two for a review of all the yips papers and demographics). To date, only two yips studies have reported seeing a difference between the yips-affected and unaffected golfers (Adler et al. 2011; Stinear et al., 2006), with those yips-affected athletes being significantly older than those unaffected. Providing possible support that over working of motor skills may act as a potential mechanism of yips development (Smith et al., 2003).

Analysis of the demographics also revealed no significant difference in experience between the two groups within each paradoxical performance. Furthermore, within golf, there was no significant difference in handicap. Thus supporting that individuals of all levels and experience can suffer with these symptoms (See chapter two). However, caution is merited when interpreting the handicap data, as only current handicap was recorded, the participant's best handicap was not recorded. This is important as Adler et al. (2011) reported that those golfers who reported experiencing the yips had a significantly lower best handicap than those non-affected. This may be a greater indictor of yips impact as this is a measure of skill level, and this would suggest that the onset of the yips contributed to a drop in handicap.

A novel approach utilised in the current study was to investigate the different symptoms experienced for both forms of paradoxical performance. The symptoms checklist was developed based on the findings in chapter two and three (chapter two and chapter three). This checklist included 19 symptoms including a range of psychological and physical symptoms. The athletes also had an option to report any further symptoms that they experienced: however, no athletes reported any. It therefore, could be argued that the findings conceptualise a comprehensive checklist of symptoms for the yips and choking alike. Based on the symptoms experienced, the athletes were categorised using the two-dimensional yips model. From the 61 yips-affected athletes eight were identified as being type-I, six as type-II, and the remaining 45 were identified as type-III.

Jerks and loss of control of limbs were the symptoms most frequently reported for both type-I and type-III athletes. None of the type-I athletes experienced uncontrollable movement of limbs but one did identify a loss of control of limbs. The psychological symptoms most frequently endorsed by the type-II and type-III athletes included increased negativity, self-consciousness, nervous and anxiety. Further analysis revealed that the golfers were more likely to experience both psychological and physical symptoms compared to the archers. Further, there was no type-I golfers; no golfer endorsed physical symptoms only. This may support the earlier suggestion that golfers may experience greater psychological symptoms due to the risk and consequences involved with a poor shot (leader board and end position of ball) than archers. For example, if an archer misses a shot, this may impact their score but they will shoot from the same position, whereas if a golfer misses, this will impact both the leader board and the potential difficulty of the next shot (end position).

In summary, this is the first study to create a symptom checklist, so although there is no opportunity for comparison, the symptoms reported do match those symptoms mentioned in previous qualitative analysis (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2012). Furthermore, the current study provides the first prevalence rates for those who experience choking, and supports previous literature for the prevalence rates of those yips-affected.

4.4.4 Two-Dimensional Model

The current study aimed to test the validity of the two-dimensional yips model (see figure 4.1)**.** Based on the symptoms checklist, the findings support chapter two proposal that the majority of athletes would experience a type-III symptoms (n = 45). Accordingly, the 20 variables and the inclusion of the three control variables (past control, present control and future control) were analysed to see if there was a difference between the three yips sub-groups. The analysis revealed a significant difference between the three sub-groups for 13 variables; the biggest differences were between the type-I and type-III for 11 of these variables. There were differences highlighted between type-II and type-III (two variables) and type-I and type-III (four variables). The type-III group experienced significantly higher levels of anxiety sensitivity for social concerns compared to both the type-I and type-II groups. This further supports the role of socially influencing factors within the yips (Fleet & Hewitt, 2014). These preliminary findings provide initial support for the two-dimensional yips model (chapter two; Smith et al., 2003); however, as there are low participant numbers within both the type-I and type-II groups, future research should aim to recruit higher numbers in each sub-group.

Athletes were categorised into symptoms groups: physical, psychological and combined. The analysis revealed that there were a total of eight athletes who experienced just physical symptoms, 34 who experienced just psychological symptoms and 111 who experienced a combination of both. This would suggest that the 2D model may be applied to other forms of paradoxical performances, as a way of classifying athletes based on the nature of their symptoms (physical, psychological or both). The most prevalent symptoms experienced included; loss of precision (*n* = 67); loss of control (*n* = 52); increased negativity (*n* = 84); self-conscious (*n* = 68); can't control thought process (*n* = 53); can't focus (*n* = 60); and self-critical (*n* = 78). These symptoms would support a number of the qualitative accounts of both yips and choking (e.g., Bennett et al., 2015; chapter two; Hill et al., 2010).

An analysis was also conducted to see if the three different groups reported differences in the 20 variables. The results revealed that those who displayed both physical and mental symptoms experienced higher levels of public self-consciousness and non-display of imperfection. These variables were lowest in those who experienced physical symptoms alone. This further suggests the key role that social anxiety plays within the experience of negative psychological symptoms and potentially provides support to Leary's (1992) proposal that competitive anxiety revolves around self-presentational implications of competition, as discussed earlier. Furthermore, these findings support the suggestion by Mesagno and Marchant (2013) that there may be differences in types of choking experienced by those who experience high levels of private and public self-consciousness respectively.

In summary, the current study investigated the accuracy of the two-dimensional yips model (chapter two) and provided initial support, using a symptom checklist to classify athletes. The findings revealed significant differences in a range of variables between the different yips classifications. Furthermore, the current study provided some initial evidence that this model may actually be applied to other forms of paradoxical performances such as choking. In particular, forms of social anxiety seem to be the key difference in the symptoms experienced by the individuals in different groups.

4.4.5 Practical Implications

The current findings provide some practical implications worth highlighting; however, as suggested in chapter three there is obvious caution when generalising results from a sport-specific study to other sports (Guiccardi et al., 2010). First, the current study has provided a number of potential predictors for those likely to experience a yips or choking experience. This study has also shown complexity of choking and the yips, given the range of different psychological traits that play a role in each and the previous qualitative accounts of each. As such, the CPM and YPM may help inform practitioners and coaches on those athletes who are more susceptible to experiencing these paradoxical performances (Hill et al., 2010; Lobinger et al., 2014). For instance, those individuals who have reported higher levels of anxiety sensitivity, self-presentational concerns or perfectionism are likely to experience choking and yips behaviour. As such, practitioners can develop tailored interventions to help clients cope more effectively with pressured environments, to ensure they remain in a consistent, positive and confident mind-set for performance. These findings further support the need for coaches to refrain from using social comparison in their communication to athletes, given the increased influence of self-consciousness in the experience of both the yips and choking.

According to Lobinger et al.'s (2014) three stages of diagnosing paradoxical performance, the implementation of the current symptom checklist, can help support practitioners with the first stage of this model, which is the explorative stage. This focuses on the practitioner gaining an understanding of the athlete's experiences of the paradoxical performance and the interpretation of these. As seen in previous anecdotal and qualitative studies (Bennet et al., 2014; Gucciardi et al., 2010), there are a range of different symptoms reported in each paradoxical performance. As such, this checklist may help practitioners to gain a clearer understanding of the symptoms experienced, so that they are better able to classify athletes correctly. Therefore, successful classification of these symptoms will allow for practitioners to provide more informed tailored interventions to support their clients.

4.4.6 Limitations and future directions

There are a number of limitations of the current study that should be remedied in future work. Online methods prove an effective way of recruiting larger number of participants (Lonsdale et al. 2006). However, there are two key potential limitations associated that warrant discussion, which is measurement errors and technical difficulties (Granello & Wheaton, 2004). Very little is known about the psychometric implications of changing a survey from traditional methods (Arnau, Thompson, & Cook, 2001). However, the reliability analyses revealed the measures used were reliable and similar to previous studies. Second, there may be a number of technical issues that can cause issues with the data collection process (Granello & Wheaton, 2004). In the current study, data was not collected for 54 of the athletes for age and gender and thus full analysis for these two variables cannot be made. However, Lonsdale et al. (2006) indicated that using online methods to collect data in sports allowed for a better response rate in an online group compared to traditional pen and paper groups, and significantly less missing responses and were returned faster. Thus, highlighting online methods as an effective way of obtaining a unique sample with adequate numbers, particularly in sports (Lonsdale et al., 2006).

Another potential limitation of the current study was that the classification of both yips and choking was based on self-report. This is particularly pertinent within the yips literature as recent research by Klampfl et al. (2014) suggested that future research should use more objective yips criterion like screening tests to classify athletes. As the current study was investigating psychological traits of individuals with the yips, the use of self-report was considered the most effective and appropriate approach. However, we support the suggestion that when conducting laboratory studies, a more objective criterion is warranted particularly when investigating the different mechanisms during high-pressure environments.

4.4.7 Conclusion

In conclusion, the current study partially addresses aim three of this thesis by providing evidence which strongly suggests that social factors play a key role in the experience of the yips in sport. While, a range of social, anxiety and perfectionism factors play a key role in choking. This study also addressed Lobinger et al.'s (2014) call for research investigating a number of psychological characteristics as potential predictors of paradoxical performances. This is the first study to investigate the role of perfectionism self-presentation within sport, never mind within the experience of paradoxical performance, and is the first study to the authors knowledge to investigate such a range of psychological traits in the experience of the yips and choking, providing two predictive models. This further emphasises the role personality traits play in the susceptibility of paradoxical performances, particularly the role of perfectionistic self-presentation. These findings also present initial support for the validity of the two dimensional yips model, not only within yips performance, but also for choking alike, thus partially addressing aim four of this thesis. Based on the present findings, this thesis will look to develop further understanding of the role of the social perfectionism variables in predicting performance in a pressured environment, while testing predictors with the inclusion of a range of psycho-physiological, kinematic and performance parameters, specifically investigating the three yips sub-types.

Chapter 5: Psychological, Physical and Kinematic factors of Paradoxical Performances

The previous four chapters have provided detailed exploration of the role of psychological predictors associated with choking and the yips. The novel findings from chapter four revealed that the dimensions of perfectionistic self-presentation may play an important role within the experience of the both forms of paradoxical performance. Furthermore, perfectionism and the big five personality traits were also highlighted as playing a prominent role in both the yips and choking given their inclusion in both the YPM and CPM. As such these three factors will be focussed on specifically as key predictors of paradoxical performance in the final study. Furthermore, as highlighted in chapter two and previous reviews (Hill et al., 2010; Lobinger et al., 2014), future research testing mechanisms (ACT/ CPH) and predictors should include a range of psychological, physical, kinematic and performance variables simultaneously to gain a greater and more holistic understanding of paradoxical performances. Consequently, the current study will aim to be one of the first studies to investigate the yips using this more holistic approach to performance. As such, the aim of this chapter is to address aims two and three (investigate the predictors and mechanisms associated with the yips), by meeting objectives three (exploring predictors), four (applicability of yips model) and five (explore the mechanism) of this thesis, during low and high-pressure performance in golfer and archers.

5.1 Introduction

The aim of the experimental chapters to date has been to focus on understanding the role of psychological traits in predicting those individuals more susceptible to experiencing choking or yips behaviour. Particularly chapter four provided evidence for the role of three prominent traits predicting yips and choking behaviours in perfectionistic self-presentation, the big five personality and perfectionism. Although these findings support previous literature (Byrne et al., 2015; Mesagno et al., 2011), limited research to date has provided a holistic approach to investigating performance under pressure and paradoxical performance (Beilock & Carr, 2001; Cooke, Kavussanu, McIntyre, Boardley, & Ring, 2011; Cooke et al., 2010; Klampfl, Philippen, & Lobinger, 2014). This approach will allow for a greater appreciation and understanding of the precise predictors and mechanisms of both forms of paradoxical performance (Cooke et al., 2010; Lobinger et al., 2014). The exact and precise mechanism and implications of the yips and choking still remains a source of debate within the literature (Hill et al., 2010), which may be caused due to the lack of research taking a holistic approach. Therefore, the current study will look to investigate the role of psychological, physiological and kinematic variables under pressure further understand the predictors and mechanism associated with the yips and choking.

5.1.1 Psychological Mechanisms

During chapter one, two of the most popular mechanism used to describe the negative relationship between anxiety and performance, in the ACT (Eysenck & Derakshan, 2011) and the CPH (Beilock & Carr, 2001; Masters, 1992; Masters & Maxwell, 2008). Both the models provide alternative explanations for why performance breaks down under pressure. The ACT, concerns the implications of worrisome thoughts on the working memory and the number of attentional resources available for a task, whereby worrisome thoughts consume limited attentional resources and restrict the amount available for task completion. Yet, worrisome thoughts can have positive implications by acting as a source of motivation, by which the individuals increase effort (and attentional resources) to use on the task demands, which can compensate for any negative implications on performance. However, these additional resources will only be invested, if the individual believes there is a chance of success (Williams et al., 2002). Whereas, the CPH posits that performance deterioration stems from an internal focus in the desire to ensure effective performance occurs (Beilock & Carr, 2001; Masters, 1992; Masters & Maxwell, 2008). For a skilled performer, an internal focus on controlling the kinematics of a movement can instigate a drop in performance as there is an interference of the slower conscious thoughts with the automatic unconscious movements resulting in an un-coordinated, undesirable movement (Masters & Maxwell, 2008). Both these mechanisms have received support in a range of studies (Eysenck & Deraksham, 2011; Beilock et al., 2002) which have utilised dual-task paradigms at manipulating golfers to focus inward on performance process or distraction and found performance deteriorated.

Interestingly, limited research has been conducted to show the influence of competitive pressure on the role of reinvestment and conscious processing (Cooke et al., 2010). A possible explanation for this, may be the difficultly in ascertaining how effort is utilised during high pressure environments, for instance, if it is used for self-focus or to increase attentional resources (e.g. Cooke et al., 2010). To date only Cooke et al. (2011) has attempted to differentiate the roles of conscious processing and mental effort, and found that mental effort acted as a partial mediator for performance under pressure yet conscious processing did not. This suggests that mental effort may play a more influential role on the anxiety-performance relationship, than conscious processing, yet further research is warranted. Therefore, the aim of the current study will be to focus on the role that mental effort has on performance outcome and kinematic performance.

5.1.2 Psychological Predictors

As reported in chapter four of this thesis and in previous research (Byrne et al., 2015; Geukes et al., 2012; Roberts et al., 2013; Mesagno et al., 2012) a number of individual differences have been highlighted as being associated with the experience of both forms of paradoxical performance. Based on the previous chapter, the three key traits that were the strongest predictors in the YPM and the CPM will be focussed on in the current study; perfectionism, perfectionistic self-presentation and the big-five personality traits.

The first trait that will be investigated is perfectionism, which is a multi-dimensional concept that is characterised by the setting of and pursuit of extremely high goals in conjunction with severe criticism of one's behaviour (Frost et al. 1990; Hewitt & Flett, 1991). Chapter four revealed that three of Frost's (1990) six perfectionism dimensions were predictors of the CPM (concern over mistakes, parental expectation and doubts over actions). These findings support previous literature highlighting the role perfectionism has on choking (Guiccardi et al., 2010). Interestingly, chapter four revealed that none of the perfectionism dimensions were highlighted as being significantly different between yips-affected and unaffected athletes. These findings support Klampfl et al. (2013), however they do not support those of Roberts et al. (2013) and Bennett et al. (2016) who found that three perfectionistic tendencies (personal standards, organization, and concern over mistakes) associated with perfectionistic concerns were higher in yips-affected athletes. It is worth noting that Klampfl et al. (2013) recruited a much smaller sample sizes (n < 50) compared to chapter four and Roberts et al. (2013) studies (n >100). Therefore, the smaller sample size may have only been powered to detect large effect sizes. However, Roberts et al. does highlight that perfectionism scores were low compared to other perfectionism studies (Rice & Mirzadeh, 2000; Sapeja et al., 2011); this was also the case for the findings in chapter four. Furthermore, these studies did not administer a sport specific measure of trait perfectionism. Therefore, the current study will investigate the influence of perfectionistic striving and concerns on paradoxical performance using the Sport Multidimensional Perfectionism Scale-2 (SMPS; Dunn et al., 2002).

The second key individual difference the current study investigates is perfectionistic self-presentation. This involves individuals wanting to perform perfectly in social situations, and do not want individuals to witness or be aware of their imperfections (Hewitt et al., 2003). Flett and Hewitt (2014) reported that understanding these forms of self-presentation is particularly important when trying to understand people who perform in front of crowds. To date, chapter four is the only study to investigate the role of Hewitt et al.'s (2003) model in sporting performance. The findings revealed that non-display of imperfection was significantly higher in choking-affected athletes compared to those unaffected, whereas, within the yips category, non-display of imperfection and perfectionistic self-promotion was significantly higher in those yips-affected. Therefore, the current study aims to investigate the role of these predictors further during high pressure performance.

The final individual differences investigated are the Big-Five personality traits (openness, extraversion, neuroticism, conscientiousness and agreeableness). Although these traits have been shown to be associated with academic performance (Poropat, 2011), job performance (Oh et al., 2011) and team performance (Bell, 2007); there are only two studies to date, which investigate the role of these traits in high-pressure performances (Byrne et al., 2015; Chapter four). Byrne et al. (2015) investigated whether any of the big-five personality factors could predict those individuals who choke, and those who thrive, under different forms of pressure on a decision making task. The findings indicated that higher levels of neuroticism and agreeableness were negatively associated with poor performance during social pressure, and social and time pressure. Byrne et al. suggested that this provided support to distraction theories such as the ACT (Eysenck et al., 2007; 2011; see chapter one for a detailed description of distraction theories) proposing that pressure environments severely consume working memory attentional resources of highly neurotic individuals. Therefore, these individuals are likely to experience deterioration in performance. The findings from chapter four, however, suggest that lower levels of conscientiousness were associated with both forms of paradoxical performances. This suggests that those individuals who try to refrain from acting within social norms, are less thorough, less careful and more risk taking, are also more likely to experience the yips. Woodman et al. (2010) suggest that those high in conscientiousness place greater emphasis on appropriate preparation. Therefore, the aim of this study will aim to gain a novel understanding into the roles of personality traits as potential predictors in elite fine motor skill performance under pressure.

5.1.3 Physiological and Kinematic Mechanisms

When athletes are performing under pressure, psychological pathways are not the only avenue to be influenced, as competitive pressure can influence cardiovascular and kinematic variables (Kreibig, 2010; Pijpers, Oudejans, & Bakker, 2005). For instance, increases in cardiovascular responses such as heart rate, can be indicative of emotional or motivational processes such as increased cognitive anxiety, somatic anxiety and mental effort (Kreibeg, 2010). Thus, they provide insight into the role of the ACT (Eysenck & Derakshan, 2011); for example, studies have highlighted that an increase in competitive pressure was associated with subsequent increases in heart rate and anxiety (Cooke et al., 2010, 2011; VeldhuijzenVan Zanten et al. 2002). Therefore, the current study assesses heart rate as a measure of competitive pressure and anxiety to see if an appropriate pressure environment was created.

Kinematic measurement may also provide a key insight into the theoretical mechanisms associated with performance of motor skills during pressure performances (Cooke et al., 2010, 2010; Gray et al., 2013). For golf in particular, the performance of the putt is reported as being the most important quality in determining performance outcome and financial success on the PGA tour (Alexander & Kern, 2005). However, due to the complex nature of the movements associated with golf and archery performances, a change or variation in kinematic execution during high-pressure may represent a reinvestment of conscious processing (e.g., Marquardt, 2007; Mullen & Hardy, 2000; Cooke et al., 2011). This may have particularly negative implications on performance as both archery and golf are sports where success derives from the performance of complex sensorimotor acute movements (Balk et al., 2013; Cooke et al., 2010, 2011).

To date, the majority of studies investigating paradoxical performance and kinematic measures have focussed on golf (Cooke et al., 2010, 2011; Maxwell, Masters, & Eves, 2005). For example, Maxwell, Masters and Eves (2005) found that when golfers where under high-pressure situations, where there was a demand for resources of the working memory, individuals experienced a greater level of jerkiness and decreased smoothness of the downswing of the putt.

Conversely, Mullen and Hardy (2000) revealed no change in kinematic measures between low and high-pressure environments using a two-dimensional kinematic analysis of club and arm movement. Furthermore, Cooke et al. (2010) adopted a more detailed approach, assessing movement on the X, Y and Z axis for lateral, vertical and back and forth movement assessing club head orientation, club head height and impact velocity revealing that during high-pressure situations, golfers increased lateral club head acceleration, which resulted in a performance drop. However, a possible limitation of these studies was that they focussed on novice golfers and therefore different mechanisms may regulate this type of performance compared to experts (Gray, 2004) particularly for reinvestment models (Masters & Maxwell, 2008). Yet when Cooke et al. (2011) investigated this in expert performance, using a similar approach to the 2010 study, they revealed that changes in movement kinematics was not responsible for changes in putting accuracy under high-pressure. It is worth noting that no one in this study experienced a drop in performance outcome and therefore, the mechanisms experienced may not fully represent the kinematic mechanisms evident during an actual choke.

Within the yips literature, there is a limited amount of research assessing the role of golf kinematic measures in yips performance (Klampfl, et al., 2013b; Klampfl et al., 2014; Philippen et al., 2014). Klampfl et al. (2013a) investigated a range of golf kinematic measures (face angle velocity and acceleration at impact) associated with yips performance during golfing performance. They highlighted little change in kinematic measures between yips-affected and unaffected golfers between low and high-pressure conditions. A limitation of this study is associated with the classification method. Firstly, they do not identify clearly if these athletes are type-I, type-II or type-III. Secondly, they classified if individuals were yips-affected or not based on the main author's ability to judge obvious physical changes (twists and jerks) instead of being based on kinematic variable data. Therefore, this may be a questionable form of classification. Using similar kinematic measures, Klampfl et al. (2014) revealed that yips behaviour did not change between two conditions (skill-focus and extraneous). Yet this study had similar limitations to the earlier Klampfl et al. study. Finally, Philippen et al., (2014) assessed golf kinematic variables (club angle, velocity, wrist angle) during single hand putts with and without the presence of the ball. They revealed that yips symptoms were not present when the ball was not present, and that maximal rotation velocity and larger number of directional changes in the affected wrists rotation were significantly different during yips-affected and unaffected performance, particularly when using the dominant hands. It is worth noting, that only Klampfl et al. (2013b) incorporated a pressure trial, which is particularly important given the yips have been identified as being exacerbated in pressure situations, even those who experience type-I (Smith et al., 2003). However, the success of this manipulation is questionable, as there was no change in anxiety between conditions (pressure and control). Thus, the aim of the current study will be to induce a competitive pressure situation to assess the variation in kinematic measures of yips-affected archers and golfers. As of yet, there is no research investigating the implications of pressure on archery performance in choking or yips literature.

5.1.4 Present study

The present study will manipulate a pressure environment to induce yips and choking symptoms and assess the complexities of performance under pressure including the range of psychological, kinematic, physiological and performance measures. This will be achieved by exploring these in a population who have been susceptible to choking and the yips and exploring how these individuals perform in low and high-pressure situations. The literature highlights the effects that competitive pressure has on a range of psychological, physiological and kinematic variables (e.g., Cooke et al., 2010). Although research has documented these effects, there is limited research on the influencing role these play directly on performance (Cooke et al., 2010; 2011; 2014). Thus, this study will aim to test the different mechanisms by investigating the change in kinematic variables (CPH) and mental effort (ACT). The study will also incorporate three potential predictors that where highlighted at being linked with the yips and choking from previous literature (Bennett et al., 2016; Byrne et al., 2015; Roberts et al., 2013) and chapter four: perfectionism, perfectionistic self-presentation and the big-five personality traits. Although research has investigated these measures in isolation (e.g., Geukes et al., 2012; Mesagno et al., 2012), few studies have investigated these simultaneously (e.g., Cooke et al., 2010, 2011; Klampfl et al., 2013). This simultaneous approach, should afford greater understanding of paradoxical performances.

Finally, the current study aims to build on the findings of chapter four for the demographics of both those who have experienced yips and choking. To date there is limited demographic information for those choking-affected, and there are unequivocal findings for those yips-affected. For instance, the majority of literature has indicated no significant difference in age, handicap and experience (see chapter two), and yet limited studies have found differences in age (yips-affected being older; Adler et al., 2011; Stinear et al., 2006). However, this was not found in chapter four. Therefore, the current study will look to assess age, experience, handicap and length of time at highest level, like chapter four, as well as including best handicap, particularly as Adler et al. (2011) revealed that yips affected golfers had a lower best handicap than those unaffected. Suggesting this may be due to the onset of the yips symptoms.

5.1.5 Aims

This study aims to further address the second and third aim of the thesis to investigate potential predictors and mechanisms associated with the yips and choking, by quantitatively exploring these (objective three of the thesis). Specifically, there are three aims to the current study:

There are three aims to the current study:

1) To investigate whether the psychological, physiological, kinematic and performance variables are different between yips-affected and unaffected golfers and archers and those choking-affected and unaffected golfers and archers.

2) To investigate the influence perfectionism, perfectionistic self-presentation, the big-five personality traits have on anxiety and mental effort, physiological, kinematic and performance variables in golf and archery.

3) To provide further insight into the demographics (Handicap, experience, best handicap, current handicap, age, and length of time at the highest level) and symptoms of athletes who experience choking and the yips.

5.1.6 Hypotheses

Based on previous research and thesis chapters, the current study hypothesised the following for aim 1:

1.1 Yips-affected athletes would experience significantly higher levels of perfectionistic self-promotion, non-display of imperfection, perfectionistic concerns, neuroticism, mental effort and heart rate than those unaffected, while experiencing significantly lower levels of perfectionistic strivings and conscientiousness and greater variability in performance measures for golf and archery than those unaffected.

1.2 Choking-affected athletes would experience significantly higher levels of non-display of imperfection, neuroticism, perfectionistic concerns, mental effort and heart rate than those unaffected, whilst experiencing significantly lower levels of perfectionistic striving and conscientiousness and greater variability in performance measures for golf and archery than those unaffected.

Based on previous research and thesis chapters, the current study hypothesised the following for aim 2:

2.1 Perfectionistic concerns, perfectionistic self-promotion, non-display of imperfection and neuroticism will have a negative relationship with performance outcome, whilst mental effort, conscientiousness and perfectionistic strivings will have a positive relationship with performance outcome.

2.2 Perfectionistic striving, perfectionistic concerns, perfectionistic self-promotion, non-display of imperfection, mental effort, conscientiousness and neuroticism will be associated with an increased variability in kinematic (golf and archery) measures between low and high-pressure.

2.3 Perfectionistic striving, perfectionistic concerns, perfectionistic self-promotion, non-display of imperfection and neuroticism will be positively associated with mental effort whilst conscientiousness will be negatively associated with mental effort.

2.4 Perfectionistic concerns, perfectionistic self-promotion, non-display of imperfection and neuroticism will be positively associated with anxiety intensity and negatively associated anxiety interpretation. Conscientiousness and perfectionistic striving will be negatively associated with anxiety intensity and positively with anxiety interpretation.

Based on previous research and thesis chapters, the current study hypothesised the following for aim 3:

3.1 There would be no difference in age, current handicap, experience, length of time at the highest level between those yips-affected, choking-affected and their unaffected counterparts.

3.2 Yips-affected golfers will have a significantly higher best handicap than those unaffected, but no difference between choking groups.

5.2 Method

5.2.1 Participants

Fifty (*M*-age = 38.60, SD = 18.44) participants (Male *n* = 48, Female *n* = 2) volunteered to take part in the current study, which is similar to previous research in laboratory studies (Cooke et al., 2010; 2011; Klampfl et al., 2013). An *a priori* power analysis conducted in G*Power revealed that the 50 participants would be sufficient to detect a small to medium effect size (partial η^2) of .09, assuming a power of .09 and alpha of .05. Golfers and archers were also recruited as yips and choking was reported as being prevalent in these sports (see chapter three, chapter four). All the participants were aged 18 or older and either an archer who competed at county level using a recurve bow, or a golfer with a handicap of 15 or below (*M*-handicap = 9.70, SD = 7.34). Recruitment for the study was obtained using opportunity sampling by contacting local county sides (in archery) and local golf clubs, using personal contacts within sport and through social media (Facebook and Twitter).

5.2.2 Ethics

Research complied with The British Psychological Society's ethical guidelines (BPS, 2009; 2010; 2013) and ethical approval was obtained from the Life Sciences Research Ethics Committee (Ethic approval Number: REF: LSREC_1415_23) at the University of Derby.

5.2.3 Design

This experiment employed a within-subjects factor, pressure condition, with two levels: low and high. Participants completed three blocks of trials: 1) familiarisation, 2) low-pressure, 3) high-pressure. For golfers each block included 20 putts (10 from 5ft, 10 from 7ft) and for the archers each block included nine shots from 18 metres. A correlation analyses was conducted to observe relationships between the trait and state psychological measures with the physiological, kinematic and performance measures. A 2 (yips: yes/no) x 2 (choking: yes/no) x 2 (sport: golf/archery) between group analyses was adopted to explore the differences in scores of perfectionism, perfectionistic self-presentation, individual differences, mental effort, heart rate and kinematic measures between those participants between the groups.

To ensure the environment was a high-pressure one, additive psychological factors were incorporated (e.g., Baumeister & Showers, 1986) including: competition, social environment and monetary rewards. As such, low (control) and high-pressure environments were created and this will be discussed.

Familiarisation

The familiarisation trial was started once the participants had signed the consent form and completed the first set of questionnaires. This trial mimicked the exact order of the low and high pressure trials in the number of putts/shots taken. This was to allow the participant to familiarise themselves with the study order, but also to help control for any learning effects from completing the experiment (Cooke et al., 2010).

Low-pressure

The low pressure trail started after the familiarisation was complete. At the start of the low-pressure trial the participant was provided with an audio file which documented the condition and sport specific instructions. The audio file ensured consistency in the instructions presented to the participants (See Appendix S). Participants were asked to complete their sport specific task and informed of the scoring system (see performance measures). Only the main researcher and the research assistant were present during this condition.

High-Pressure

The high pressure condition started directly after the low pressure trial. The high-pressure condition was identical to the low-pressure trial in relation to the number of attempts and scoring for the performance task. The audio file administered included condition and sport specific instructions (see Appendix T). To increase the pressure experienced by the participant, the audio file revealed that the shooting technique video would be sent to a national team coach to analyse their technique and performance (False story; Geukes et al., 2013). The audio file specified that the authors were looking for a smooth controlled execution of their shooting/putting technique. The participants were also told that they would be randomly placed into a team of two, where they were instructed that if both members increased performance by 20% or maintained maximum performance (based on low-pressure condition) then they would be in with a chance of winning a monetary reward of £50 (similar to that in Beilock & Carr, 2001;). Furthermore, they were informed that their partner had already managed to achieve and improve their performance, and as such the success of the team was dependant on their performance. A leader board was also displayed beside the performance venue (putting green/archery shooting lane) and at the University of Derby (Sport Science Laboratory) highlighting the top five teams (similar to Cooke et al., 2010).

5.2.4 Measures

5.2.4.1. Psychological Measures

A range of measures were used to assess perfectionism, perfectionistic self-presentation, and the Big-Five personality traits. All measures had a similar Cronbach's alpha to previous literature unless otherwise stated. The Cronbach's alpha for the current study and previous studies are detailed in Table 5.1.

Demographics Questionnaire: The demographics questionnaire recorded information such as age, gender, experience and contact details. This was collected at the start of the study.

The Sport Multidimensional Perfectionism Scale-2 (SMPS-2; Dunn et al., 2002: See Appendix N*)* is a 30-item multidimensional scale that evaluates how athletes view certain aspects of the sporting environment. This is assessed using six subscales: Personal Standards (PS, seven items: e.g., "*I have extremely high goals for myself in my sport*"); Concern over Mistakes (COM, eight items: e.g., "*If I play well but only make one obvious mistake in the entire game, I still feel disappointed with my performance*"); Perceived Parental Pressure *(*PPP: 9 items: e.g., "*In competition, I never feel like I can quite meet my parents expectations*"); Perceived Coach Pressure (PCP, six items: e.g., "*Only outstanding performance in competition is good enough for my coach*"); Doubts About Action (DAA, six items e.g., "*I usually feel uncertain as to whether or not my training effectively prepares me for competition"*); and Organisation (ORG, six items, e.g., "*On the day of competition I have a routine that I try to follow"*). Participants rated how much they agree with each of the statements on a 5-point Likert-type scale (1=Disagree strongly, 5= agree strongly). The scale showed good reliability in the same study. However, Dunn et al. (2006) identify that further validation work in different sporting environments is required. This was completed at the start of the study.

The Big-Five Inventory-10 (BFI-10: Rammstedt & John, 2007: See Appendix I) is a shortened 10-item version of the well-established Big-Five Inventory (BFI: John et al., 1991) that consists of 44 items. The BFI-10 assesses the big-five characteristics: extraversion (two items: e.g., "I *see myself as someone who is outgoing, sociable*"); agreeableness (two items: e.g., "*I see myself as someone who is generally trusting*"); conscientious (two items: e.g., "*I see myself as someone who does a thorough job*"); neuroticism (two items: e.g., "*I see myself as someone who gets nervous easily*"); and openness to experiences (two items: e.g., "*I see myself as someone who has an active imagination*"). The BFI-10 has good psychometric qualities and had better test-retest reliability than other 10 item personality measures (Rammstedt & John, 2007). The current study reported a Cronbach's alpha score similar to previous literature for extraversion and openness. However, the subscales for agreeableness, conscientiousness and neuroticism were not reliable (See Table 5.1). Even so, scores are presented in the analyses but are interpreted with caution. This was completed at the start of the study.

Perfectionism Self-Presentation Scale (PSPS: Hewitt et al., 2003: See Appendix G) is a 27-item multidimensional scale that evaluates an individuals need to appear perfect to others. The scale consists of three subscales: perfectionistic self-promotion which assess the need to appear perfect to others (10 items: e.g., "*I try always to present a picture of perfection*"); non-display of imperfection which assess the need to avoid looking imperfect to others (10 items: e.g., "*I judge myself based on the mistakes I make in front of people*"); and non-disclosure of imperfection which asses the need to avoid revealing imperfections to others (Seven items: "*It is okay to show others I am not perfect*"). The scale showed good psychometric qualities including overall scale reliability, and all three subscales showed good test-retest reliability (Hewitt et al., 2003). The current study reported a Cronbach's alpha score similar to previous literature for perfectionistic self-promotion and non-display of imperfection. However, there were issues with reliability with the subscales for non-disclosure of imperfection (See Table 5.1). Even so, scores are presented in the analyses but are interpreted with caution. This was completed at the start of the study.

The Rating Scale of Mental Effort (RSME; Zijlstra, 1993: See Appendix O) is a single item measure of how much mental effort has been exerted by an individual during a task. The participants rated this on a scale that ranges from 0 to 150 with nine descriptive labels across the continuum (e.g., not effortful, awfully effortful). The scale has been shown to have acceptable test-retest reliability (Zijlistra, 1993). The current study reported a Cronbach's alpha score similar to previous literature (See Table 5.1). This was completed straight after the last putt/shot in both the low-pressure and high-pressure trial.

The Choking demographic form was a self-report measure that identified if the participant had ever experienced a dramatic drop in performance that had been out of their control. Those who identified 'yes' on this form identified what symptoms they experienced, which was developed from chapter four. This included a number of physiological and psychological symptoms including: jerks; tremors; spasms; freezing; uncontrollable movement of limbs; loss of control of limbs; loss of precision; sweating; butterflies; jittery; self-consciousness; can't control thought process; nervous and anxious; can't focus; unable to make a decision; threatening; increased negativity; self-critical; and can't control emotions. Finally, the participants were asked to report the last time the individual experienced a choke. This outlined if any of the participants perceived if they had choked in the study (See Appendix P). This was completed after the putting or shooting trials ceased.

The Yips demographic form was a self-report measure which identified if the participant had ever experienced the yips (golf) or target-panic (archery). Those who identified 'yes' on this, identified what symptoms they experienced which was developed from chapter four. This included a number of physiological and psychological symptoms including; jerks; tremors; spasms; freezing; uncontrollable movement of limbs; loss of control of limbs; loss of precision; sweating; butterflies; jittery; self-consciousness; can't control thought process; nervous and anxious; can't focus; unable to make a decision; threatening; increased negativity; self-critical; and can't control emotions. This group also answered a number of yips specific questions, severity of the yips on performance; aspect of the game affected (golf); bow affected (archery); how long they had suffered with symptoms; are they currently suffering; and when was their last experience of the yips/target-panic (See Appendix Q). This was completed after the putting or shooting trials ceased.

5.2.4.2. Manipulation Check

The Revised Competitive State Anxiety Inventory-2 (CSAI-2R; Cox, Martens, & Russell, 2003; Martens, Burton, Vealey, Bump, & Smith, 1990: See Appendix R) is a 27-item measure that evaluates an individual's intensity and interpretation of anxiety and confidence leading up to competition. This is assessed over three subscales: *somatic anxiety* (nine items: e.g., "I feel Jittery"), *cognitive anxiety* (nine items: e.g., "I am concerned about this competition") and *self-confidence* (nine items: e.g., "I feel self-confident"). Participants rated the intensity of each item on a 4-point Likert-type scale (1=not at all, 4= very much so), and they also rated their interpretation of each item on a 7-point Likert-type scale (-3= very negative, +3= very positive). This sport specific self-report inventory has been shown as a valid and reliable measure (Jones & Hanton, 2001, Jones & Uphill, 2004). The current study reported multiple Cronbach's alpha scores similar to previous literature (See Table 5.1). This was completed before both the low-pressure and high-pressure triasl after the participant had listened to the audio file.

5.2.4.3. Physiological Measures

Heart Rate (HR): A Polar (F1) heart rate monitor was used to record HR during both the archery and golf tasks. This involved attaching the monitor around the chest of the participant, whilst the receiver (a watch) was worn on their wrist. The recording of the participants HR was initiated at the start of each trial and ceased once each trial was finished, with the mean HR being recorded for each trial (using the lap function of the watch).

5.2.4.4 Biomechanical Measures

Kinematics: The Quintic Biomechanical V26 Software package (Quintic Consultancy, LTD, Coventry) was used to analyse kinematics for both putting (length of stroke path and club head velocity) and archery (Shot draw length, draw time, draw length alterations) shooting tasks. Kinematic analysis occurred in a two-dimensional plane (Sagittal and Frontal), with signal being digitised to 1000 Hz. An average of each of the variables from each trial in each condition was calculated to provide a mean test value (e.g., Cooke et al., 2010).

For the golf task, the club head kinematics for each putt was determined from the start of the backswing until the putter contacted the ball. The length of the stroke path (SPL) was calculated and allowed club head velocity (CHV) to be assessed. Furthermore, the attack angle at of the club at ball contact was also measured (AABC).

For the archery task, length of draw (LOD) was obtained by calculating the spatial distance between markers on both forth finger knuckles and draw length alteration was defined as the change in draw length during the release phase. Draw time (DT) was obtained by calculating the length of time spend from when the archer achieved full draw and when they release the arrow. Bow arm wrist hyperextension and bow arm wrist ulna deviation (WA), shoulder abduction/adduction limb alignment (SAB) and bow arm elbow extension (SAN) were also calculated at release.

5.2.4.5 Performance Measures

The current study focussed on two sports (Golf and Archery) where success is based on an athlete's ability to execute fine motor skills with precision. The current study involved participants conducting sport specific shooting tasks. For golf, the participants completed a total of 60 putts on an indoor golf putting surface from five feet and seven feet with a point being awarded for each successful putt in three blocks (20 shots in each block). For archery, the participants completed a total of 27 shots (9 shots in each block) from 18 metres (replicating indoor competition distance) using official World Archery Federation indoor targets.

Table 5.1

Cronbach alpha scores for the current study and previous studies

Characteristic	Current Cronbach α	Previous Reported Cronbach α
Perfectionism Strivings (SMPS)	.88	.92
Perfectionistic Concerns (SMPS)	.94	.55
Neuroticism (BFI-10)	.31	.74
Extraversion (BFI-10)	.71	.83
Agreeableness (BFI-10)	.46	.68

Conscientious (BFI-10)	.49	.77
Openness (BFI-10)	-.83	.72
Non Display of imperfection (PSPS)	.84	.83
Non-Disclosure of imperfection (PSPS)	.5	.78
Perfectionistic self-promotion (PSPS)	.84	.86
Cognitive Anxiety Intensity (CSAI-2R)	.85	.79-.83
Cognitive Anxiety Interpretation (CSAI-2R)	.87	.79-.83
Somatic Anxiety Intensity (CSAI-2R)	.77	.79-.83
Somatic Anxiety Interpretation (CSAI-2R)	.85	.79-.83
Confidence Intensity (CSAI-2R)	.78	.79-.83
Confidence Interpretation (CSAI-2R)	.90	.79-.83

5.2.5 Procedure

When participants expressed an interest in taking part in the current study (by contacting the main researcher via social media, email, telephone), and if they met the inclusion criteria, they were sent an informed consent form to complete. Once this was returned to the main researcher, a suitable time was organised in order to start the data collection. Data collection took place in two places. For the golfers testing took place in the Kirtley Laboratory on the Kedleston Road Campus of the University of Derby. The archery testing took place at an indoor archery shooting venue at a Derbyshire Archery Club. On arrival at the laboratory, participants were informed that the purpose of the study was to look at their shooting or putting technique. Participants then completed the Sport MPS-2 (Dunn et al., 2002), BFI-10 (Rammstedt & John, 2007) and the PSPS (Hewitt et al., 2003). This was completed in a randomised order for every participant. Once completed, the participants were informed about the upcoming sport specific trial in a closed setting (Beilock & Carr, 2001; Tanake & Sekiya, 2010).

The golfers completed 20 self-paced randomised putts from five and seven feet respectively. In both low and high-pressure environments, the shots order was randomised in blocks of five putts at a time to reduce familiarity of putt distance (similar to Cooke et al., 2010; Wilson et al., 2007). In addition, the participants were informed that they only had one attempt at each shot. Participants used their own putters, but were provided with standard golf balls. After each shot the experimenter retrieved the ball and positioned it at the distance required for the next shot.

The archers completed nine shots, in sets of three, from 18 metres using an Official World Archery Federation indoor target. The participant had a total of 90 seconds to shoot each set of three arrows. Once a block was completed, the experimenter would retrieve the arrows and return them to the participant. Participants used their own bow and arrows.

Once the familiarisation session was completed the participants were equipped with a HR monitor for the remainder of the experiment. The biomechanical markers were then applied to the participants' putter (for the golfers) or the performance specific limbs (for the archers; see *biomechanical measures*). The participant was then sat in a chair and provided with an audio file stating information on the upcoming trial (*see low-pressure condition*). Once the participant had finished listening to the audio file, they completed the CSAI-2R, followed by completion of the sport-specific task low-pressure condition. After the final shot/putt was completed the participant completed the RSME and the HR monitor was stopped and the mean beats per minute for the whole block was recorded. The participants were given a five-minute rest period. The high-pressure condition was identical to the low-pressure, with the only difference being the pressure manipulation (see *high-pressure condition*).

After the high-pressure condition was completed the biomechanical markers and HR monitor were removed from the individual. The participants were then fully debriefed (especially concerning the false story and videotaping purpose) and thanked for their participation. This testing protocol lasted approximately one hour.

5.2.6 Analytic strategy

Data was analysed using SPSS version 22. In order to test the aims of the study, the analytical strategy included five steps: 1) T-test's (or non-parametric alternatives) were conducted to test if there were any differences between the demographics between the golfers and the archers in the current study: 2) In order to test the effectiveness of the pressure environment a manipulation check analysis involved conducting t-tests (or non-parametric alternatives) on the psychological, physiological, kinematic and performance state measures between the low and high-pressure trials: 3) A preliminary analysis revealed that the yips group was not homogeneous; there were significant differences in a number of variables between those yips-affected athletes who experienced choking and those who did not. Consequently, to test if there were significant differences between those yips-affected and their unaffected counterparts, and those choking-affected and those unaffected, a 2 (Choking = Yes & No) x 2 (Yips = Yes & No) x 2 (Sport = Golf & Archery) MANOVA was used: 4) In order to test if there were any relationships between the trait/state psychological measures and physiological, kinematic and performance measures, Pearson's (or non-parametric alternatives) correlations were conducted. For the psychological (anxiety, confidence and mental effort), physiological (heart rate) and performance (total score or number of putts) state measures the high-pressure score was used. For the kinematic measures the variability between low and high-pressure trial was used as the score: and 5) T-test's (or non-parametric alternatives) were conducted to see if there were any differences in demographics between both paradoxical performances and those unaffected in the current study. All tests were two-tailed with an alpha set at 0.05.

5.3 Results:

The results are divided into five sections: demographics, manipulation checks, differences between groups, relationships between state and trait measures, and choking/yips symptoms experienced. Of the 50 recruited participants none reported experiencing the yips or choking during the performance. Therefore, the yips and choking groups were formed based on participant's self-report or previous experience of the yips and choking. A preliminary analysis revealed that there was a significant difference between those yips-affected golfers who experienced choking (n = 8) and those yips-affected golfers who did not experience choking (n =

5) on a range of the psychological measures. Therefore, the groups were not homogenous and thus, the groups were looked at individually (see table 5.2).

Table 5.2

The number of individuals in both yips-affected and unaffected and choking-affected and unaffected athletes.

Sport	Yips - Yes	Yips - No
Golf	11	33
Archery	2	4
Total	13	37

Sport	Choking - Yes	Choking - No
Golf	31	5
Archery	5	1
Total	44	6

5.3.1 Section One: General Demographics

This section reports the key demographics (See Appendix V for Means and SD's) of the participants including age, years' experience, years competing at the highest level, current handicap and best handicap (for golf only). There were issues with normality for best handicap, and therefore a non-parametric alternative was conducted. A Mann Whitney test indicated that archers were significantly older than golfers, $U = 48$, $p = .012$. A Mann Whitney test also indicated that there was no difference between the years of experience of golfers and archer's $U = 126.5$, $p = .87$ or years played at the highest level $U = 126.5$, $p = .87$. Finally, a Wilcoxon Signed-Ranks Test indicated that the best handicap ranks were significantly lower than the current handicap ranks, $Z = -4.230$, $p < .001$.

5.3.2 Section Two: High and Low-Pressure Differences (Manipulation Check)

This section reports the data for all the state measures comparing the two conditions (low-pressure v high-pressure) using t-tests (See Appendix V for Means and SD's). First, the psychological and physiological measures including: heart rate, cognitive anxiety (intensity and interpretation), somatic anxiety (intensity and interpretation), confidence (intensity and interpretation) and mental effort will be reported. The second section will report the kinematic variables for golf (club head velocity, CHV; stroke length, SL and; attack angle at ball contact, AABC) and archery (draw time, DT; length of draw, LOD; shoulder abduction, SAB, shoulder angle, SAN and; wrist angle, WA) as well as performance outcome in golf (5ft putting score and 7ft putting score) and archery (archery total score). A total of five participant's kinematic data (golfers) were not recorded due to issues with the Quintic software.

5.3.2.1 Psychological and Physiological Measures

There were issues with normality for cognitive anxiety intensity, cognitive anxiety interpretation, somatic anxiety intensity, somatic anxiety interpretation, heart rate and mental effort. Therefore, appropriate non-parametric tests were conducted. A Wilcoxon Signed Ranks Test indicated that cognitive anxiety intensity, $Z = -3.806$, $p = <.001$, somatic anxiety intensity, $Z = -2.490$, $p = .013$, heart rate, $Z = -2.306$, $p = .021$ and mental effort, $Z = -4.98$, $p = <0.001$ were significantly higher and somatic anxiety interpreted more negatively, $Z = -2.118$, $p = .034$, in the pressure situation. A paired samples t-test indicated that participants interpreted confidence more negatively during the high-pressure environment, $t\ (49) = 2.037$, $p = 0.047$. There were no other significant differences between the low and high-pressure trials.

5.3.2.2 Performance Process and Outcome

Table 5.3 shows the means and standard deviations for the performance process and outcome measures in golf and archery. There were issues with normality for CHV at 5ft and 7ft, SL at 7ft, and all three performance scores (5ft putting score, 7ft putting score and total archery score). Therefore, appropriate non-parametric tests were conducted. A Wilcoxon Signed Ranks Test indicated that the 5ft putting score significantly increased in the high-pressure environment, $Z = -2.519$, $p = .012$. A paired samples t-test indicated that participants experienced significantly increased SL at 5ft, $t\ (49) = -3.657$, $p = 0.001$; significantly increased AABC at 5ft, $t\ (38) = -2.689$, $p = 0.011$, and significantly longer DT, $t\ (5) = -2.986$, $p = 0.031$.

5.3.2.3 Participants Qualitative Accounts-Social Validation

Alongside the questionnaires highlighting that the high-pressure situation had increased levels of cognitive and somatic anxiety, the participants emphasised that they felt increased pressure in the post experiment questionnaire. The participants suggested that this pressure was caused from being paired with a partner, wanting to perform to the best of their ability for money, the leader board and trying to perform the technique in a smooth controlled manner. This further strengthens the findings that a high-pressure environment was created, however, three participants identified not experiencing any pressure during the high-pressure trial. See Appendix U for a list of the participant's qualitative data about the high-pressure trial.

Table 5.3

*Total Mean and Standard Deviation for the performance process and outcome measures in golf and archery (*p = <0.05; **p = <0.01).*

	Pressure Condition	
	Low-Pressure	High-Pressure
Variable	Mean SD	
5FT Putting Score*	8.70 (1.58)	9.3 (1.21)
7ft Putting Score	7.6 (2.19)	7.89 (1.88)
Archery Total Score	76.83 (7.08)	78.17 (6.74)
SL 5ft**	17.14 (4) cm	18.25 (4.5) cm
SL 7ft	19.88 (6.2) cm	21.47 (1.0) cm
AABC 5ft*	1.97 (2.26) °	2.4 (2.35) °
AABC 7ft	2.59 (2.32) °	2.87 (2.23) °
CHV 5ft	.92 (.11) m/s^{-1}	.95 (.1) m/s^{-1}
CHV 7ft	1.09 (.33) m/s^{-1}	1.07 (.13) m/s^{-1}
LOD	70 (.6) cm	67 (.6) cm
WA	172.29 (5) °	173.23 (4.76) °
SAN	66.71 (6.74) °	66.79 (8.12) °
SAB	90.48 (1.95) °	90.38 (1.72) °
DT*	2.46 (.98) sec	2.75 (.89) sec

SL= Stroke length; AABC= Attack angle at ball contact; CHV= Club head velocity; LOD= Length of draw; WA= Wrist angle; SAN= Shoulder angle; SAB= Shoulder abductor; DT= Draw time.

5.3.3 Section Three: Analyses between Yips-Affected and Choking-Affected Athletes

5.3.3.1. Preliminary Analyses

A preliminary analysis revealed that the yips group was not homogeneous; there were significant differences in a number of variables between those yips-affected athletes who experienced choking and those who did not. This section will look to address aim three of the current study. The demographics for each of the categories (Choking; yes and no; Yips: yes and no) are reported in the sections below including, age, level of experience (School/University, club, county, national and international), current handicap and best handicap. See Appendix V the results of these differences between the demographic data.

5.3.3.2 Main Analyses- Psychological and Physiological

This section reports the statistical analyses associated with aim one of the study. A 2 (Choking = Yes & No) x 2 (Yips = Yes & No) x 2 (Sport= Golf & Archery) MANOVA examined main effects and interactions between the independent variables and the psychological and physiological measures. Tables 5.4 show the means and standard deviations for both yips groups and choking groups for the psychological and physiological measures. The main analysis revealed that there was a significant multivariate main effect for yips, F (6, 43) = 2.02, p = .05, Wilk's λ = 0.42, partial η^2 = .58 and sport, F (6, 43) = 1.82, p = .004, Wilk's λ = 0.31, partial η^2 = .69. There was a near significant main effect for choking, F (6, 43) = 2.02, p = .057, Wilk's λ = 0.42, partial η^2 = .58. There was a significant interaction between choking and sport, F (6, 43) = 2.053, p = .05, Wilk's λ = 0.41, partial η^2 = .59. There was no significant interaction between yips and choking, F (6, 43) = 1.29, p = .27, Wilk's λ = 0.53 and yips and sport, F (6, 43) = 1.28, p = .27, Wilk's λ = 0.53, partial η^2 = .47.

Yips: Univariate analyses revealed that yips-affected athletes had significantly lower mental effort at high-pressure F (6, 43) = 8.22, p = .006, partial η^2 = .16 and HR at high-pressure, F (6, 43) = 4.07, p = .05, partial η^2 = .09, than those who had never experienced the yips.

Choking: Univariate analyses revealed that yips-affected athletes had significantly lower mental effort at high-pressure, F (6, 43) = 10.88, p = .002, partial η^2 = .20, and HR at high-pressure, F (6, 43) = 15.46, p < .001, partial η^2 = .26 than those who had never experienced choking.

Sport: Univariate analyses revealed that archers experienced significantly higher levels of somatic intensity at high-pressure, F (6, 43) = 6.49, p = .014, partial η^2 = .13, and HR at high-pressure, F (6, 43) = 14.71, p < .001, partial η^2 = .26, compared to golfers. Furthermore, the analysis revealed that golfers experienced significantly higher levels of confidence intensity at high-pressure, F (6, 43) = 6.15, p = .017, partial η^2 = .13, compared to archers.

Choking and sport: Univariate analyses revealed that there was a significant interaction between choking and sport for mental effort at high-pressure F (6, 43) = 11.00 p = .002, partial η^2 = .2 and HR at high-pressure F (6, 43) = 8.16, p = .007, partial η^2 = .16. Where HR was higher in archers and mental effort was higher in golfers.

Table 5.4

Total Mean, SD, for each variable for both yips and choking groups (p<0.05, p<0.01**, p<0.001***).*

		Yips				Yips	
		Yes	No			Yes	No
Variable	Sport	Means (SD)		Variable	Sport	Means (SD)	
Perfectionistic Striving	*Golf*	3.34 (.93)	3.53 (.74)	Perfectionistic Self-Presentation	*Golf*	4.06 (.91)	3.77 (1.25)
	Archery	3.39 (.49)	3.21 (.41)		*Archery*	4.35 (.35)	4.1 (1.21)
	Total	3.34 (.86)	3.49 (.71)		Total	4.11 (.85)	3.81 (1.23)
Perfectionistic Concerns	*Golf*	2.58 (.74)	2.5 (.72)	Non-Display of Imperfection	*Golf*	3.83 (1.1)	3.71 (1.24)
	Archery	2.35 (.56)	1.71 (2.6)		*Archery*	3.7 (.99)	3.02 (.95)
	Total	2.54 (.7)	2.41 (.72)		Total	3.81 (1.04)	3.64 (1.22)
Cognitive Intensity	*Golf*	1.91 (.71)	1.97 (.69)	Non-Disclosure of imperfection	*Golf*	3.56 (.49)	3.7 (.94)
	Archery	2.05 (.24)	2.11 (.33)		*Archery*	4.57 (.4)	3.68 (.67)
	Total	1.93 (.66)	1.98 (.66)		Total	3.97 (.54)	3.7 (.91)
Cognitive Interpretation	*Golf*	4.01 (1.72)	3.63 (1.29)	Extraversion	*Golf*	3.77 (.65)	3.45 (1.06)
	Archery	3.6 (.39)	3.49 (.76)		*Archery*	3 (.71)	3 (1.15)
	Total	3.95 (1.58)	3.78 (1.19)		Total	3.65 (.65)	3.41 (1.06)
Somatic Intensity	*Golf*	1.69 (.68)	1.74 (.5)	Agreeableness	*Golf*	3.41 (.77)	3.68 (.8)
	Archery	2.56 (.47)	2.14 (.58)		*Archery*	2.5	4.38 (.75)
	Total	1.82 (.72)	1.79 (.52)		Total	3.27 (.78)	3.76 (.81)
Somatic Interpretation	*Golf*	4.1 (1.59)	3.99 (1.03)	Conscientiousness	*Golf*	3.32 (1.12)	3.7 (.98)
	Archery	3.5 (.08)	3.78 (1.37)		*Archery*	3.5 (.71)	4.08 (.8)
	Total	4.01 (1.47)	3.97 (1.05)		Total	3.35 (1.05)	3.75 (.96)
Confidence Intensity	*Golf*	3.08 (.59)	2.88 (.59)	Neuroticism	*Golf*	2.82 (1.06)	2.91 (.87)
	Archery	2.17 (.39)	2.58 (.38)		*Archery*	2.25 (1.06)	2 (.91)
	Total	2.94 (.65)	2.85 (.57)		Total	2.73 (1.03)	2.82 (.91)
Confidence Interpretation	*Golf*	5.06 (1.45)	5.13 (1.24)	Openness	*Golf*	3.73 (.72)	3.48 (.65)
	Archery	3.78 (.79)	5.09 (.73)		*Archery*	4 (.71)	3.5 (.71)
	Total	4.86 (1.43)	5.21 (1.02)		Total	3.77 (.7)	3.48 (.65)
Heart Rate *	*Golf*	80.36 (12.9)	86.24 (10.64)	Mental Effort **	*Golf*	120 (31.54)	121.67 (21.89)
	Archery	104 (43.84)	99.75 (14.1)		*Archery*	85 (91.92)	95 (48.73)
	Total	84 (19.43)	87.7 (11.63)		Total	114.62 (41.30)	118.47 (30.7)

		Choking				Choking	
		Yes	No			Yes	No
Variable	Sport	Means (SD)		Variable	Sport	Means (SD)	
Perfectionistic Striving	*Golf*	3.62 (.72)	3.16 (.86)	Perfectionistic Self-Presentation	*Golf*	3.95 (1.29)	3.59 (.81)
	Archery	3.17 (.36)	3.74		*Archery*	4.1 (1.05)	4.6
	Total	3.55 (.69)	3.2 (.84)		Total	3.97 (1.25)	3.66 (.82)
Perfectionistic Concerns	*Golf*	2.55 (.68)	2.43 (.81)	Non-Display of Imperfection	*Golf*	3.83 (1.25)	3.51 (1.06)
	Archery	1.91 (.52)	1.95		*Archery*	3.3 (1.02)	3
	Total	2.4 (.79)	2.4 (.79)		Total	3.76 (1.22)	3.47 (1.03)
Cognitive Intensity	*Golf*	1.96 (.7)	1.92 (.68)	Non-Disclosure of imperfection	*Golf*	3.72 (.86)	3.78 (.86)
	Archery	2.07 (.3)	2.22		*Archery*	3.91 (.78)	4.29
	Total	1.98 (.66)	1.94 (.66)		Total	3.75 (.84)	3.82 (.84)
Cognitive Interpretation	*Golf*	3.63 (1.29)	4.45 (1.37)	Extraversion	*Golf*	3.39 (.95)	3.88 (.96)
	Archery	3.49 (.76)	3.33		*Archery*	2.9 (1.02)	3.5
	Total	3.61 (1.22)	4.37 (1.35)		Total	3.32 (.96)	3.86 (.93)
Somatic Intensity	*Golf*	1.7 (.53)	1.81 (.59)	Agreeableness	*Golf*	3.65 (.84)	3.54 (.69)
	Archery	2.16 (.5)	2.89		*Archery*	4 (1.06)	2.5
	Total	1.76 (.54)	1.88 (.64)		Total	3.69 (.86)	3.46 (.72)
Somatic Interpretation	*Golf*	3.96 (1.13)	4.15 (1.3)	Conscientiousness	*Golf*	3.63 (1.01)	3.88 (.92)
	Archery	3.73 (1.19)	3.44		*Archery*	4.1 (.89)	4
	Total	3.93 (1.13)	4.1 (1.26)		Total	3.69 (.99)	3.89 (.88)
Confidence Intensity	*Golf*	2.94 (.59)	2.94 (.59)	Neuroticism	*Golf*	2.92 (.86)	2.81 (1.05)
	Archery	2.55 (.33)	1.89		*Archery*	2.2 (.91)	1.5
	Total	2.88 (.58)	2.87 (.63)		Total	2.83 (.89)	2.7 (1.07)
Confidence Interpretation	*Golf*	5.13 (1.24)	5.27 (.95)	Openness	*Golf*	3.47 (.58)	3.5 (.82)
	Archery	5.09 (.73)	3.22		*Archery*	3.5 (.79)	3.5
	Total	5.12 (1.17)	5.12 (1.06)		Total	3.47 (.78)	3.5 (.78)
Heart Rate* **	*Golf*	84.19 (11.9)	86.15 (10.3)	Mental Effort**	*Golf*	122.26 (26.01)	118.85 (20.22)
	Archery	94.4 (17.09)	135		*Archery*	95 (48.73)	150
	Total	85.61 (12.96)	89.64 (16.38)		Total	118.85 (30.7)	121.07 (21.14)

5.3.3.3 Main Analyses- Kinematic Measures

A 2 x 2 MANOVA examined the associations between the independent variables and the kinematic measures. The analysis revealed that there was no significant main effect for the yips, F (3, 35) = .69, p = .69, Wilk's λ = 0.836, partial η^2 = .16, or for choking, F (3, 35) = 1.376, p = .25, Wilk's λ = 0.19, partial η^2 = .28, for the golf kinematic measures. The means for both choking and the yips can be seen in table 5.13 and table 5.14. Due to the small numbers within the archery sample, these findings were not reported, however these are provided in Appendix V.

Golf Kinematics: Univariate analyses revealed that there was a significant difference in the variation in performance for club head velocity at 7ft, F (3, 35) = 5.02, p = .032, partial η^2 = .13, between those yips-affected and those unaffected. Univariate analyses also revealed that there was a significant difference between those who were choking-affected and those who were not, for the variation in performance for CHV at 7ft, F (3, 35) = 5.50, p = .025, partial η^2 = .14.

5.3.4 Section Four: Relationship between Trait and State Measures

This section addresses aim two of the study. This section will report the relationships between the trait and state measures using correlations. For the psychological (cognitive anxiety intensity/interpretation, somatic anxiety intensity/interpretation, confidence intensity/interpretation and mental effort), physiological (HR) state measures and performance scores (5ft/7ft putting score and archery total score) for the high-pressure condition were used. The variation between the low-pressure and high-pressure conditions will be used for the kinematics measures for golf (SL, AABC and CHV) and archery (LOD, WA, SAN, SAB and DT). Only the significant inferential statistics will be provided.

5.3.4.1 Trait Measures Against State Measures

Table 5.15 shows the means and standard deviations for the each of the variables used in the correlation analysis. There were issues with normality for a number of variables and therefore non-parametric alternatives were conducted.

Perfectionism: This section will detail the relationship data between perfectionistic striving (PS) and perfectionistic concerns (PC) with the psychological, physiological and kinematic state measures. A Pearson correlation revealed that there was a significant relationship between PS and SL at 5 feet, $r = .37$, $p = .02$; a positive relationship between PC and cognitive intensity at high-pressure, $r = .37$, $p = .008$; LOD, $r = .88$, $p = .02$ and SAN, $r = .91$, $p = .01$; a negative relationship between PC and cognitive interpretation, $r = -.31$, $p = .03$, confidence intensity at high-pressure, $r = -.29$, $p = .04$, confidence interpretation at high-pressure, $r = -.3$, $p = .04$, and HR at higher pressure, $r = -.34$, $p = .02$. Finally, a Pearson correlation revealed that there was a positive significant relationship between PS and PC $r = .307$, $p = .03$. There were no other significant relationships between any of the other variables.

Self-Presentation Perfectionism: This section will detail the relationship data between Perfectionistic Self-Promotion (PSP), Non-Display of Imperfection (NDISP) and Non-Display of Imperfection (NDISC) with the psychological, physiological and kinematic state measures. A Pearson's correlation revealed there was no significant relationship between PSP and any of the variables. A Pearson's correlation revealed that there was a positive significant relationship between NDISP and cognitive intensity at high-pressure, $r = .38$, $p = .006$, and WA, $r = .81$, $p = .05$, and a positive significant relationship between NDISP and SAN, $r = .85$, $p = .03$. A Spearman's correlation revealed that there was a positive significant relationship between NDISC and LOD, $r = .88$, $p = .02$, and a negative significant relationship between NDISC and CHV at 5 feet, $r = -.34$ $p = .04$. There were no other significant relationships between any of the other variables.

Big-Five Personality Traits: A Spearman's correlation revealed that there was a significant relationship between neuroticism and cognitive intensity at high-pressure $r = .37$, $p = .01$ and cognitive interpretation at high-pressure $r = -.33$, $p = .02$. There were no other significant relationships between any of the other variables.

5.3.4.2 Mental Effort and Performance Measures

This section will look at the correlations for mental effort and the physiological and kinematic variables. A Spearman's correlation revealed that there was a significant positive relationship between mental effort and cognitive anxiety intensity, $r = .32$, $p = .02$, and somatic anxiety intensity $r = .36$, $p = .01$. There were no other significant relationships between any of the other variables.

5.3.5 Section Five: Choking and Yips Symptoms

Within this section we will look to address aim three of the study. This section will report the symptoms experienced for both choking and yips symptoms which can be seen in Appendix V. Based on the previous yips model (chapter two; Smith et al, 2003), three sub-groups were created to see if there was a difference in symptoms for paradoxical performances for both yips and choking categories. The data for these can be seen in Appendix V.

5.4 Discussion

As reported in chapter two, Lobinger et al. (2014) and Hill et al. (2010), its imperative that research investigating the mechanisms of paradoxical performance incorporated a holistic approach measuring psychological, physiological, kinematic and performance variables to gain a complete picture of performance under pressure. As such, the current study intended to address this with three overarching aims, the first aim was to investigate whether the psychological, physiological, kinematic and performance variables are different between yips-affected and unaffected athletes in both golf and archery. The second aim was to further investigate the influence of perfectionism, perfectionistic self-presentation, the big-five personality traits, anxiety and mental effort, on the physiological, kinematic and performance variables in both golf and archery during low and high-pressure performance. The final aim was to provide further insight into the demographics and symptoms of those yips-affected and choking-affected athletes. Throughout this discussion the following sections will be addressed; the manipulation checks, the effects of pressure, a discussion of the choking and the yips, the relationship between trait and state measures, and the symptoms of both forms of paradoxical performance. As there is an extensive list of hypothesis, each section will restate the hypotheses and discuss the findings in the detail discussing the implications on the extant literature, and how it influences our current thinking.

5.4.1 Manipulation Check

In order to be able to test aim one and two effectively, it was imperative to ensure that a competitive pressured environment was created. As such, a range of measures (HR, anxiety and qualitative accounts) were incorporated to test the effectiveness of the high-pressure manipulation. The findings suggested that the current study was successful in achieving a high pressured environment as participants experienced a significant increase in HR, self-reported mental effort, cognitive and somatic anxiety intensity and adopted a more negative interpretation of confidence between the low and high-pressure environments. These quantitative scores were also supplemented by the qualitative responses from participants social validation question data on what caused the increased in pressure, for example one participant suggested "*the fact that my partner has done his or her bit for the team"* as a source of their pressure, whereas, another highlighted "*money influence, leader board, getting videoed/recorded and swing getting analysed".* Accordingly, these findings suggest that the study managed to create an effective high-pressured competitive and engaging environment, as individuals had an increase in anxiety, HR mental effort, as per real life sporting situations (Cooke et al., 2010; Hardy et al., 2007). However, it is worth noting that three did not perceive to be under pressure during the high-pressure trial, and this may have had an impact of the current study findings.

5.4.2 Effects of Pressure on Performance

Pressure had different effects on the two key performance measures: process and performance outcome. In terms of performance outcome, the number of successful putts at five feet increased from low to high-pressure. However, there was no difference in the number of successful putts from seven feet, or the total archery score. These are contrary to the majority of literature in the area which has found an increased negative effect of pressure on performance, in skilled participants (e.g., Wilson et al., 2006), but does support a minority of literature that has found a performance increase (e.g., Mullen & Hardy, 2000, Woodman et al., 2010). However, these studies utilised a range different measures such as; accuracy, distance from the cup (hole) and mean radial error have been used to test the outcome of performance under pressure (Cooke et al., 2010, 2011; Mullen & Hardy, 2000) and have found that pressure had a negative impact on performance (Cooke et al., 2010; 2011; Mullen & Hardy, 2000). This approach may provide a greater indication of performance than just the outcome alone, which was the case in the present study.

When looking at the kinematic measures it revealed that there were significant increases in both golf and archery measures. For the golfers, the increase was witnessed at five feet for stroke length and attack angle at ball contact. This is particularly interesting given that performance at this distance also increased. This change in movement variability supports other research that has also seen changes in kinematic variables between high and low-pressure in golf such as club head velocity, club acceleration and face angle (e.g., Cooke et al., 2011; Klampfl et al., 2013b). However, the increase in performance was not expected, as the change in movement variability has been associated with reinvestment and conscious processing, which can be detrimental for performance for elite athletes (Masters, 1992; Masters & Maxwell, 2008). The CPH (Masters, 1992) suggests that when elite athletes try to consciously control their performance, they risk de-automatizing the skill, resulting in a breakdown in their performance.

For the archers, in the high-pressure environment, an increase in length of time at full draw was witnessed, however, this did not result in any change in performance. This may have been a result of the increased mental effort invested under high-pressure causing the archer to spend more time on the aiming and release phase of the shot. The ACT (Eysenck & Derakshan, 2011) suggests when the attentional capacity is overloaded with anxiety, a deterioration in performance ensues. Although the current study's findings, did not support the assumptions of the ACT as an increase in anxiety did not represent a change in performance outcome. However, the ACT does suggest that individuals will only invest effort if they feel confident in the chances of success (Eysenck & Derakshan, 2011). In the current study there was no change in confidence witnessed, however the confidence levels for both condition was quite high. Therefore, the increased mental effort may have been invested for motivational purposes (Hill et al., 2010a).

An alternate explanation for there being no change in performance witnessed, may stem from the lack of difficulty of the current task. For instance, the putting task was completed on a flat indoor putting green with no obstacles or slopes that needed accounting for, with a regular size cup. Similarly, the archery shooting was completed from the shortest competition shooting distance. Furthermore, it is evident from the post-experiment demographics form, that individuals did not experience a choke or yip during the trial. However, according to the ACT principles, the increase in mental effort may have been appropriate to compensate for any potential performance drops. For instance, if the current study had increased the task difficulty by potentially minimising the size of the cup, or introduced slopes, then the level of cognitive processing required to complete the task successfully would have been greater (Cooke et al., 2011). As such, an increase in pressure may have elicited a greater impact on performance efficiency, where the additional resources would not have been able to compensate for the impact on performance effectiveness, particularly at five feet. This may provide an explanation as to why putting at seven feet did not significantly improve, as there was a greater difficulty to the task for the athlete.

It is worth noting though that previous studies investigating the yips have highlighted that symptoms are likely to manifest in shots within two metres of the cup (Klampfl et al. 2013; 2014; Smith et al., 2000; 2003) which was the same in the current study. However, no participants in the current study identified experiencing either the yips or choking during the high-pressure trial. Therefore, the main analysis used previous experience as a grouping factor of both forms of paradoxical performances and as such these findings, particularly for the kinematic measures may be speculative, and warrant further investigation.

5.4.3 Choking and the Yips

The first aim of the study was to investigate whether psychological, physiological, kinematic, and performance variables are different between choking-affected and unaffected, and yips-affected and unaffected golfers and archers. The current findings reject the current hypotheses on the psychological and physiological variables in both the yip and choking groups. For instance, both yips-affected and choking-affected participants experienced a lower mean heart rate, alongside investing less mental effort during the high-pressure trial compared to their unaffected counterparts. Although there were significant differences in mental effort and heart rate, these were in the opposite direction from what was expected. For instance, Wilson et al. (2007) found that when individuals were in high-pressure situations they increased the level of the mental effort in order to try and maintain performance levels, supporting the ACT (Eysenck & Derakshan, 2011). However, previous literature has highlighted that an individual's ability to cope effectively may alleviate the likelihood of experiencing a choke (Hill & Shaw, 2013). Therefore, the individuals in the current study who have experienced choking or the yips in the past, may have potentially adopted an approach-coping strategy to help manage emotional distress associated with evaluation apprehension (Bennett et al. 2015; Hill & Shaw, 2013; Toering et al., 2011). Furthermore, Klampfl et al. (2013) suggests that there are no differences in stress coping strategies between yips-affected and non-affected golfers, although caution is warranted due to small sample size recruited. As none of the participants experienced a yip or a choke during the current study, it may be argued that the participant's prior experience may have help desensitise them to the presence of pressure, which may explain the lower levels of HR exhibited by those athletes, allowing them to cope more effectively. Thus, future research is necessary to explore approach-coping and avoidance strategies in paradoxical performance looking at these as potential buffer (approach-coping) or intensifier (avoidance) of these symptoms.

The current study did not find a significant difference between any of the trait or state psychological measures, or performance outcomes between both yips-affected and choking-affected athletes and their unaffected counterparts, thus rejecting the hypotheses. This is particularly interesting given the findings in chapter four, which found conscientiousness and non-display of imperfection as predictors of both the yips and choking. Furthermore, higher levels of three of the four factors associated with perfectionistic concerns (concern over mistakes, parental expectation and doubts over actions) were associated with choking only, and perfectionistic self-promotion were associated with yips-affected athletes only in chapter four. The lack of significant differences is surprising given previous quantitative (Byrne et al., 2015; Roberts et al., 2013, chapter four) and qualitative research (Bawden & Maynard, 2001; Bennett et al., 2015; chapter three; Guicciardi et al., 2010; Hill & Shaw, 2013) supporteing the findings from chapter four. Yet, it is worth noting that the participant numbers in the both the yips (Yips n =13/ Non Yips n =37) and choking (Choking n = 36/ Non Choking n = 14) groups were uneven and so may be only powered to reveal very large effects. Thus these trait measures may still play a key role in the experience of the both forms of paradoxical performance and still warrant further investigation.

In addition, as highlighted previously, no participant in the current study experienced a paradoxical performance, as such it was unlikely to see a difference in performance outcome or kinematic measures. Consequently, future research should aim to test the variability of kinematic measures of individuals who experience a choke or the yips. However, the golfers in this study who had experienced choking and yips previously, had a greater variation in their CHV at seven feet than those unaffected athletes. Interestingly, those who experienced paradoxical performances increased the CHV, while those who were unaffected reduced their CHV in the high pressure trial. Within the archery group, the findings revealed that those who experienced the yips, had a greater LOD than those unaffected. Although these changes in kinematic variables did not influence performance outcome, these variables may provide insight into the types of variables that may be affected when individuals experience the yips in both archery and golf. As such, these variables should be measured in a sample where they are currently suffering the yips.

A potential reason for there being no difference in the majority of the psychological, kinematic and performance variables in the current study may stem from the type of environment created. Although the current study was successful in creating a high pressure environment, it may not have been effective at creating an environment to instigate a change in performance based on the key predictors of the yips specifically. For instance, according to the trait activation theory (Tett & Burnett, 2003), that highlight's that an individual's traits will influence the way in which individuals behave in different situations. As highlighted in chapter four, the predictors of the yips originate from social factors, therefore, the current study may not have created an effective environment to influence social cues. As such, future research creating pressure environments, should consider the inclusion of more social pressure, such as a crowd, or use real life competitive environments in order to increase the likelihood of inducing a choke or a yip experience. This may allow for a more accurate conclusion of the role of these traits in predicting performance outcome and kinematics.

5.4.4 Psychological predictors

This section will address the second aim of the study, which was to investigate the role of psychological trait and state measures have on the physiological, kinematic and performance variables in both golf and archery during low and high-pressure performance. As such this will allow a greater understanding of the role that each of the identified psychological traits have on performance under pressure in general.

The first set of traits in this study to be investigated were perfectionistic strivings and perfectionistic concerns. Perfectionistic striving was hypothesised to have: a positive relationship with performance outcome, mental effort and anxiety interpretation; a negative relationship with anxiety intensity; and a relationship with kinematic variability in both golf and archery. The current findings partially supported one hypotheses: as perfectionistic striving had a moderate relationship with SL at five feet in golf but not with any other variables. Therefore, golfers who had higher levels of perfectionistic striving experienced a greater change in SL at five feet from low to high-pressure than those with lower levels of perfectionistic striving. Similarly, Stoeber, Uphill and Hotham (2009) found that perfectionistic striving can have a positive impact on performance, as individuals focus on mastering the performance process to ensure a successful outcome. However, in the current study, this change in SL at five feet, did not equate to an increase in performance outcome. However, Stoeber et al. do suggests that perfectionistic concerns may have greater impact on performance outcome and processes than perfectionistic strivings.

The current study hypothesised that perfectionistic concerns would have: a negative relationship with performance outcome, anxiety (both cognitive and somatic) intensity and interpretation; a positive relationship with mental effort; and a relationship with kinematic variability in both golf and archery. Perfectionistic concerns only had a strong relationship with archery kinematic performance indicators (DT and SAN) and not with golf. Archers that were high in perfectionistic concerns took longer to release the arrow and had a greater increase in SAN from low to high-pressure than those with lower levels of perfectionistic concerns. Both DT and SAN are two indicators of the aiming phase of the archery release, and the cognitive rumination associated with perfectionistic concerns. Indeed, Sagar and Stoeber (2009) suggested that those individuals who experience high levels of perfectionistic concerns are more likely to experience poor performance under pressure, due to the increased rumination associated with making mistakes. Individuals, therefore may engage in forms of self-evaluative techniques that undermine their performance such as trying to control certain kinematic variables (Sagar & Stoeber, 2009). However, caution is necessary with the interpretation of the archery kinematic and performance scores due to the low numbers of participants recruited (*n* = 6). Interestingly though, perfectionistic concerns were not related to the performance outcome.

From a conscious processing perspective (Masters, 1992; Masters & Maxwell, 2008), the desire for execution of the smooth technique, as highlighted in the high-pressure trial, may have caused participants with higher levels of perfectionistic striving and perfectionistic concerns to reinvest effort in order to take conscious control of the motor execution in the pursuit of a successful outcome. This attempt to take conscious control may have resulted in the greater variability in both golf (SL at five feet) and archery (DT and SAN) kinematics (Baumesiter, 1984; Beilock & Carr, 2001; Guiccaiardi & Dimmock, 2010). However, this variability in movement kinematic did not result in a deterioration in performance as predicted within reinvestment models (Masters & Maxwell, 2008).

Alternatively, ACT (Eysenck & Derakshan, 2001) suggests the lack of change in performance outcome may suggest that although performance effectiveness was not impacted (i.e., performance did not drop), performance efficiency (the number of resources needed to complete the task) may have been. This is particularly of interest as Hanin and Hanina (2009) suggest that in low-pressure performance, perfectionists may experience a motivational or emotional investment increase when performance errors occur. However, under higher pressure, the potential consequences of performance errors induce negative appraisals and responses, which in turn reduce performance (e.g., Frost & DiBartolo, 2002).

Perfectionistic concerns had a moderate positive relationship with cognitive anxiety intensity and a moderate negative relationship with cognitive anxiety interpretation, confidence intensity and confidence interpretation, thus supporting hypothesis 2.4. Those participants who were high in perfectionistic concerns not only had greater intensity of cognitive anxiety symptoms, but also interpreted them in a negative fashion. As previously highlighted, those high in perfectionistic concerns are likely to engage in rumination and dysfunctional thought patterns (Roberts et al., 2014), and are likely to experience a greater anxiety response to situations when compared to those with lower levels of perfectionistic concerns (Frost & DiBartolo, 2002; Roberts et al., 2014). Furthermore, higher levels of perfectionistic concerns have been related to more debilitative interpretation of those anxiety symptoms and confidence intensity and interpretation, particularly in those more pressured situations (Dunn et al., 2011; Roberts et al., 2013). Thus, it is not surprising that in the current study, individuals with high perfectionistic concerns were likely to experience increased anxiety and viewed this anxiety in a more debilitative manner. Interestingly, though the current findings suggest that perfectionistic concerns were not related to somatic anxiety (intensity or interpretation) and was related with lower levels of HR, suggesting that the symptoms of anxiety exhibited were indeed cognitive. Thus, supporting the proposal that perfectionistic concerns is a maladaptive form of perfectionism within sport (Besser et al., 2004; Stoeber & Otto, 2006). This is further supported within the current study as those high in perfectionistic concerns also experienced a decrease in confidence and a negative interpretation of this confidence. This is particularly important given the key roles anxiety and confidence play within the ACT model (Eysenck & Derakshan, 2011) and conscious processing and reinvestment models (Master, 1992; Masters & Maxwell, 2008). Therefore, a greater understanding of the influence of both perfectionistic concerns and strivings on paradoxical performances is needed, given the important role anxiety plays (Lobinger et al., 2014).

Perfectionistic self-promotion and non-display of imperfection were the second set of traits investigated in the current study. It was hypothesised that perfectionistic self-promotion and non-display of imperfection would have a relationship with the variability in performance kinematics (golf and archery), a negative relationship with performance outcome and anxiety interpretation; and a positive relationship with mental effort, anxiety intensity. The current findings provide partial support for these hypotheses. Interestingly, perfectionistic self-promotion had no relationship with any of the variables. Fleet and Hewitt (2014) highlighted that self-presentational tendencies associated with perfectionism, specifically may provide a key insight into trying to understand people who perform in front of a crowd (Besser et al., 2010; Hewitt et al., 2011). This is of particular importance, as the central premise of perfectionistic self-promotion, is the individuals trying to perfect the image they present in the presence of others. This is the first study to test the assumption that perfectionistic self-promotion would have a role in performance under pressure in a laboratory environment. The findings do not support a relationship with perfectionistic self-promotion and key performance variables; these findings also accord with the findings in chapter four, as perfectionistic self-presentation was not identified as a potential predictor for a choking experience. However, further research should investigate the role it may play when performing in pressure situations where there is a crowd present, or an opportunity for social appraisal. The lack of a crowd in the current study, may provide further explanation as to why this was not related to any changes in mental effort, performance outcomes or kinematic variables.

Non-display of imperfection was identified as having a moderate positive relationship with cognitive intensity and a strong positive relationship with WA in archery. This suggests that individuals with high levels of non-display of imperfection were more likely to experience increasingly intense feelings of cognitive anxiety in high-pressure environments. This finding is unsurprising as the present study incorporated a form of external evaluation (from a national coach) and non-display of imperfection is defined as a desire to refrain from publically displaying any imperfections or presenting a less than perfect manner (Hewitt et al., 2014). Therefore, the participants were aware that any imperfections in performance would be evaluated, which may manifest in greater rumination and possible reinvestment to ensure these imperfections would not occur (Masters & Maxwell, 2008). Furthermore, within chapter four, non-display of imperfection was a predictor of experiencing a choke. In addition, the elite archers in chapter three indicated that they did not want to be seen as not good enough to be an elite and on the national squad. As such, this emphasises the role self-presentational perfectionism may have in inducing cognitive rumination and reinvestment. For instance, the study revealed that non-disclosure of imperfection had a moderate negative relationship with CHV in golf at five feet, and a strong positive relationship with LOD in archery. These findings were not expected as it was not highlighted as a potential predictor of choking in chapter four. In addition, it was not expected as non-disclosure of imperfection focuses on individuals abstaining from verbal disclosures of any perceived or personal imperfections (Hewitt et al., 2014). However, given that the non-disclosure of imperfection is associated with abstaining from showing imperfection, the inclusion of a leader board and analysis from a national coach, may have caused these individuals to partake in strategies to ensure performance did not drop.

Both non-disclosure and non-disclosure of imperfection are classified as avoidance actions, and previous research has indicated that performance avoidance goals are associated with negative performance outcome (Stoeber et al. 2007). Although in the current study both non-disclosure and non-disclosure of imperfection were not related to a decrease in performance, they both had relationships with golf and archery kinematic performance indicators (LOD, CHV at five feet and WA). This may indicate that a reinvestment (Masters, 1992; Masters & Maxwell, 2008) in technique was adopted by the athletes to ensure success. However, as previously highlighted, this may have had an impact on the efficiency of task completion, rather than on the performance effectiveness as they had appropriate resources available to complete the task in the current situation (Eysenck & Derakshan, 2011). As such, future research should investigate the role of non-disclosure and non-display of imperfection in performance under pressure.

The final trait measures that were investigated in the current study were neuroticism and conscientiousness. It was hypothesised that conscientiousness would have a positive relationship with: performance outcome, mental effort, anxiety interpretation and a negative relationship with anxiety intensity and interpretation. Furthermore, it was hypothesised that neuroticism would have a relationship with the variability in performance kinematics (golf and archery) and a negative relationship with performance outcome, anxiety interpretation; and a positive relationship with cognitive and somatic anxiety intensity. The findings revealed that none of the variables had a significant relationship with conscientiousness and thus the hypotheses are rejected. This is an interesting finding as within chapter four, conscientiousness was identified as the largest contributor to the CPM. In addition, Woodman, et al. (2010b) revealed that conscientiousness was positively associated with an athlete's quality of preparation in the lead up to competition. However, in the only study to date to test the role of conscientiousness, Byrne et al. (2015) reported inconclusive findings on the role of conscientiousness in decision making tasks in high and low-pressure environments in a two-part study. In the first study conscientiousness was negatively associated with decision making, yet this was not the case in the second study. For the current study, it is worth noting the subscale for conscientiousness had questionable reliability, and therefore caution is warranted when interpreting these results.

The current findings revealed that neuroticism had a moderate negative relationship with cognitive anxiety interpretation and a moderate positive relationship with cognitive anxiety intensity. The current findings support previous research that has suggested a positive association between anxiety and neuroticism (Muris et al., 2005). Byrne et al. (2015) found that neuroticism was a predicator of poor performance in decision making tasks under pressure. Conversely, the current findings did not find a relationship between neuroticism and performance outcome and process. However, this finding may support the findings in chapter four which identified that neuroticism was not a predictor for experience choking. The neuroticism subscale also had questionable reliability, and therefore the results should be interpreted with caution. Future research should incorporate the full BFI (John et al. 1991) to provide a greater indication of the role of conscientiousness and neuroticism within performance under pressure.

As highlighted previously, within this study an increase in mental effort was exhibited by participants between low and high-pressure environments. This supports previous literature which has shown that increased pressure is associated with an increased investment of self-report mental effort (Cooke et al., 2010, Wilson, 2008). The current study hypothesised that mental effort would have a negative relationship with performance outcome and a relationship with variability in performance kinematics (golf and archery). The findings rejected the current hypothesis, as mental effort was not related with any of the variables. This is particularly interesting, as according to the self-focus models (Master, 1992; Masters & Maxwell, 2008), under pressure, individuals will reinvest explicit knowledge of a task to ensure the successful completion of a task. However, according to ACT, given the potential ease of a task, individuals may have additional resources available to complete a task without increasing their mental effort (Eysenck & Derakshan, 2011). Furthermore, ACT proposes that an increase in mental effort can have positive implications on performance. Therefore, the role of mental effort on performance under pressure still warrants further investigation.

In this study, both mental effort and performance increased at five feet in golf from low to high-pressure conditions. However, there was no relationship between mental effort and performance from both putting distances (five feet or seven feet). These findings also do not support the proposal of conscious processing and reinvestment models (Master, 1992; Masters & Maxwell, 2008) which suggest that mental effort may have a negative impact on performance. Indeed, self-focus models propose that when skilled athletes reinvest mental effort, they do so to increase their conscious control over their movements, to try and ensure performance (Beilock & Carr, 2001). This then leads to a drop in performance as movement becomes de-automatised. Thus, both attention (Eysenck & Derakshan, 2011) and reinvestment models (Masters & Maxwell, 2008) may still provide a theoretical underpinning to paradoxical performances due to the increase in mental effort and movement variability. A possibility would be to assess a subjective view of if the individuals have partaken in conscious processing by provide a subjective scale (Orrell, Masters, & Eves, 2009) or if they engaged in rumination (Bennett et al., 2016). These subjective measure alongside kinematic measures and performance outcome can provide greater understanding of the role of conscious processing and in performance under pressure.

5.4.5 Demographics

The final aim of the study was to provide detailed demographics of those who have experienced choking and the yips. The findings revealed no significant difference in current handicap, years' experience and years at the highest level for both forms of paradoxical performance (Choking: yes/no; Yips: yes/no). These findings support those found in chapter four. Interestingly, the current study found that those who had experienced choking in the past had a significantly lower best handicap than those unaffected. These findings may indicate that those who had experienced choking may have dropped their handicap because of these experiences. This is the first study to report this within a choking sample. However, this may be speculation and future research should investigate this. Interestingly, this was not the case within the yips group, particularly as Adler et al. (2011) reported that yips-affected golfers had a significantly lower best handicap than those unaffected, which could be attributed to the onset of the yips. Furthermore, the current study also revealed that the yips-affected athletes were significantly older than those unaffected, thus not supporting the findings in chapter four or the majority of the literature (e.g., Klampfl et al., 2014). However, this does provide some support to Adler et al. (2011) and Stinear et al. (2006) who did find yips-affected golfers to be significantly older, however these have been tested on much smaller sample sizes ($n < 50$) to the other studies ($n > 100$).

The prevalence rate for the yips in the current study was 26%, which falls in the range (16% - 54%) highlighted in the previous literature (Chapter four; Klampfl et al., 2014; McDaniel et al., 1989). The prevalence rate for choking of 72%, was similar to chapter four's findings (67.7%). These are the only studies to date to report a prevalence rate on the choking experience and future research should investigate this further. Looking at the status of individuals who experienced both the yips and choking, the current study supports the statement highlighted in chapter four, that any level of athlete can experience either the yips or choking.

5.4.6 Practical Implications

The findings of the current study offer clear applications to a range of paradoxical performance situations. With reference to Lobinger et al.'s (2014) three stages of diagnosing paradoxical performance, the current study's findings have direct implications on all three phases: explorative, examination phase and measurement phase. The explorative phase refers to the practitioner gain an understanding of the individual's experience of the paradoxical performance. The current study, again supports the use of the symptom checklist developed in chapter four, and suggests that this may be an effective tool to aid with practitioners gaining an understanding of the athlete's situation, alongside the use of qualitative methods. The examination phase focusses on the assessing the situations in which the symptoms are prevalent. Although, the current study was effective in creating a pressured environment with reference to the manipulation check data, none of the current athletes experienced either choking or yips symptoms. As such, where possible, practitioners should aim to replicate the pressure of a real life competitive environment, which may not be possible to do so in a lab environment. Finally, this study has added to the growing evidence of the research that adopts a holistic approach by simultaneously assessing psychological, physiological and kinematic measures (Cooke, et al., 2010). The importance of this evidence from an applied perspective further emphasises the complexity of both the yips and choking, as such, it's important that practitioners use a similar multi method approach to ensure they get a greater understanding of their clients, thus aiding with the final stage of measurement of Lobingers et al. (2014) model.

5.4.7 Limitations and Future Directions

It is acknowledged that there were some limitations of the current study that should be considered for future work. First, although an appropriate competitive pressure environment was created, the ease of the putting task may have influenced the overall findings for the performance process and performance outcome. For example, the current golf putting task was completed on an indoor putting green with no obstacles or slopes to account for, with a regular size cup. This may be a difficult environment for novices, but as the participants were skilled athletes than a more difficult task would have been appropriate. For instance, previous studies have used a range of methods to increase the difficulty of the task such as range of gradients on the green, or minimising the size of the cup (Cooke et al., 2010; 2011; 2014). Therefore, future studies should incorporate these methods when testing performance under pressure in a skilled sample. As previously mentioned future research should also consider including social cues within the environment, especially if using social predictors of performance in line with the trait activation theory (Tett & Burnett, 2003).

A second limitation of the current study, was the how performance outcome was measured. Paradoxical performance usually occurs in one of event pressured event (such as needing to score a ten in an archery competition to win). However, the robustness of a sing trial study is questionable given the increased reliability and lack of reliability associated (Woodman & Davies, 2008), yet given the nature of paradoxical performance, this type of approach should not be dismissed. The current study, adopted a similar approach to previous performance under pressure studies, which is balanced between ecological validity (1 putt, Woodman & Davis, 2008) and measurement reliability (20 putts; Wilson et al., 2007). For the archery trial, this is one of the first studies to assess archery performance under pressure, as such, a similar approach to a competitive environment was adopted by shooting in blocks of three. The authors acknowledge that the approach adopted in the golf and archery trial in the repetition of task performance may have diluted the results (Cooke et al., 2010), and the type of approach adopted in future research needs careful consideration.

An important implication of the current study was the difficulty in recruiting those who were currently suffering with the yips. Although the prevalence rates for the yips range from 16% to 54% highlighted in the literature (Chapter four; Klampfl et al., 2014; McDaniels et al., 1989), but this may be representative of the yips over the career of an athletes. However, the difficulty in finding those currently affected, has meant that studies adopting a similar approach to the current study become difficult. This is reflected in the low samples sizes recruited in previous published studies, such as Philippen et al. (2014) who had six yips-affected athletes and six unaffected. Thus future research needs to take this into consideration when planning appropriate studies.

5*.4. 8. Conclusion*

In conclusion, the current study simultaneously assessed psychological, physiological and kinematic measures and adds to the growing literature on performance under pressure and paradoxical performance. This study also addressed Lobinger et al. (2014) and chapter two’s call for research to investigate each of these variables simultaneously. These findings highlight that pressure elicits effects at multiple levels in psychological, physiological and kinematic variables. This study also provides an important insight into the difficulties associated with recruiting those who are currently suffering with the yips and inducing these symptoms efficiently in a lab environment. This is also the first study to test these range of predictors in performance under pressure and paradoxical performance (perfectionism, perfectionistic self-presentation and big-five personality traits). Although this study also did not find any difference in the psychological predictors of yips and choking performance highlighted in chapter four, it provides an important step forward in understanding the complexities of both forms of paradoxical performance. This study also followed Cooke et al. (2010) call for both self-focus and distraction mechanisms of performance under pressure to be investigated concurrently to gain a greater understanding of the complexities of why performance breaks down under pressure. Although the current study was unable to test these mechanisms effectively as none of the current participants experienced a breakdown in performance, it was concluded that both self-focus and distraction models provide plausible explanations for performance under pressure and warrant further investigation. We also show further support for the use of the paradoxical performance checklist created in chapter four. As such, this study has successfully addressed this thesis aim two, three and four.

Chapter 6: General Discussion

6.1 Introduction

The current thesis had three aims: 1) to develop a definition that best encompasses all aspects of the yips; 2) to investigate the potential predictors associated with the yips and choking, and 3) to investigate the potential mechanisms associated with the yips and choking. These aims were addressed by completing one systematic review, and three studies. The systematic review focussed specifically on the yips literature, due to the recent literature review on the choking literature (Hill et al., 2010a). The first study was semi-structured interviews exploring the lived experiences of elite level archers who experienced target-panic (yips in archery) and choking. The second study was an online questionnaire study to test the potential predictors associated with the yips and choking respectively. The final study of the thesis included a lab-based study to investigate predictors and mechanisms associated with yips and choking performance in high and low pressure.

In this final chapter, the research that has been presented in this current thesis will be summarised and discussed how they addressed the thesis's aims. This chapter consists of four key sections: 1) a summary of the key findings of the systematic review and three studies presented in this thesis and also how they addressed the research questions; 2) a discussion of the theoretical implications, their impact on the extant literature and the recommendations for future research based on the current studies; 3) a discussion of the applied implications of the thesis findings; and finally 4) concluding remarks.

6.2. Summary of main findings

At the outset of this PhD thesis, the aims were to investigate the processes underpinning paradoxical performances, especially those of the yips and choking. The first aim, as detailed in chapter two, was addressed by completing a systematic review of the existing psychological, physiological and neurological components associated with the yips in sport, due to there being no previous review of its kind. This was the first study of it's nature to collate all the existing data (up to December 2013) on the yips and movement disorders in sport. A number of key findings arose from the review. It was evident that the majority of the studies and conceptualisation was specific to golfing performance. As such, it was recommended that the definition on the yips be expanded to be more inclusive of other sports. Thus, the review proposed that the yips be defined as "*a psycho-neuromuscular impediment affecting the execution of fine motor skills during sporting performance*".

Furthermore, the review proposed that Smith et al.'s (2000, 2003) continuum model should be updated to a new two-dimensional model (See figure 2.2) to include an additional yips classification (type-III) alongside those already proposed (type-I, type-II). This new sub-group allows for a large number of individuals who experience both psychological and physiological symptoms to be classified who were not included in Smith et al.'s (2000; 2003) original model. Lastly, the review highlighted that the majority of literature focused on the yips in golf, and it suggested that future research was needed to investigate the role of the yips in other sports such as target-panic (archery specific yips) in archery.

With this in mind, the first study described in chapter three, interviewed elite level archers. To date, this is the first study within paradoxical performances to investigate the lived experiences of the yips and choking simultaneously using Olympic level athletes as participants. This allowed for a greater appreciation of the emotional, cognitive, attentional and situational characteristics associated with paradoxical performance, given the status of the participant. Analysis of the interviews revealed three major themes for both choking and the yips: mind-set including expectations, self-efficacy and self-consciousness; affect including mood, anxiety, fear and dejection; and focus including conscious effort, thought control and analytical. Further two major themes that were specific to target-panic (yips in archery) were identified: perceived control including control over movement, conscious control and commitment and coping including rationalisation, mental strategies and technical strategies. The findings illustrated that target-panic is a form of the yips, as the archers experienced a range of similar physical (freezing, lack of control) and psychological (heightened self-consciousness and increased anxiety) symptoms to yips-affected golfers and cricketers (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). The findings also provided novel insight into the source of anxiety and self-consciousness feelings during choking and specifically target-panic, by highlighting the role that self-presentational concerns play. As such, future research was warranted to investigate this and other key traits as potential predictors in both choking and the yips (Bennett et al., 2015; Guiccardi et al., 2010; Hill et al., 2010b).

The findings from chapter two and three aided in the selection of variables to assess as potential predictors of both choking and the yips in chapter four. The online questionnaire assessed a range of trait measures which addressed objective three and four of the thesis. This study recruited the largest sample size to date (n =155) in the paradoxical performance literature measuring the role of psychological traits as predictors, with the closest being

Roberts et al. (2012; *n* = 120). Although the role of psychological traits in understanding paradoxical performance has gained popularity in recent research (Bennett et al., 2016; Byrne et al., 2015; Roberts et al., 2012), this is the first study to assess a comprehensive range of perfectionism, anxiety and social measurers, as opposed to focussing on one measure. The study's findings proposed a choking predicative model that was able to predict 71% of the original sample correctly and a yips predictive model that was able to predict 69%. This was the first study to use a range of anxiety, social and perfectionism factors collectively to investigate paradoxical performances (Geukes et al., 2012; Mesgano et al., 2012; Roberts et al. 2013). Of particular note, the yips predictive model highlighted that only social traits increased the susceptibility of having experienced the yips. The findings also found initial support for the two-dimensional model as the majority of the yips-affected athletes were type-III (*n*= 45), with a range of significant differences in trait measures between type-I, type-II and type-III evident. For instance, type-III yips-affected athletes experience significantly higher levels for 12 variables including a number of anxiety, perfectionism and social variables, highlighting the key role that psychological predictors could play on experience type-III yips.

Based on these findings and previous literature, chapter five tested three key psychological predictors (perfectionism, perfectionistic self-presentation and big-five personality traits) and two mechanisms (reinvestment and distraction) associated with paradoxical performance during high and low-pressure in elite level athletes. This study addressed aims two and three of the thesis. This was a novel study regarding previous yips literature, in providing a holistic view of performance by measuring a range of psychological (trait and state), physiological, kinematic and performance measures similar to previous choking literature (e.g. Cooke et al., 2010). The findings revealed that a successful pressure environment was created yet no participant experienced a yip or a choke during the trial. Therefore, the study focussed on those athletes who had previously experienced either the yips or choking previously against those that had not. This revealed there were no differences in any of the psychological trait or kinematic state measures between those yips-affected and unaffected or choking-affected and unaffected athletes. However, this may have been due to none of the current participants experiencing a yips or a choke during the study. The only differences were reported in mental effort and heart rate, suggesting that those who experienced both forms of paradoxical performances reported lower levels of mental effort and experienced lower heart rate.

6.3 Theoretical Implications and Future Directions

The focus of this section is to discuss the aims of the thesis and how the studies collectively have addressed them. It also attempts to build upon the theoretical implications previously identified. In doing so, the major future directions based on each aim are presented.

6.3.1 Aim One

The first aim of the thesis was to develop a definition that best encompasses all aspects of the yips, including the focal dystonia and choking components. This was a particularly important starting point for the thesis, as the systematic review highlighted that an understanding of the role played by the psychological and physical factors associated with the yips had been hindered due to the failure by existing studies to distinguish groups based on the symptoms experienced. The review concluded that this may reflect issues regarding both the definition and Smith et al.'s (2000, 2003) yips model's specificity to golf. For example, their definition, focussed exclusively on putting performance; however, the review highlighted that other athletes experience very similar symptoms, i.e., jerks and tremors. Thus, the new definition was proposed to be more inclusive of other sports and defined the yips as "*a psycho-neuromuscular impediment affecting the execution of fine motor skills during sporting performance"*. The current thesis provides support for this definition as a fit for both golf and archery and supports the complexity of the yips with the range of psychological, physical and neurological components associated. For instance, the findings from the interview study (chapter three) revealed that target-panic is a form of the yips, due to the archers experiencing a range of similar psychological (self-consciousness) and neuromuscular (uncontrollable movement of limbs) symptoms to those yips-affected golfers and cricketers (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2011). Thus the "*psycho-neuromuscular impediment"* aspect of the definition seems to fit appropriately in explaining target-panic. Therefore, this definition provides a more inclusive approach to allow other sports like "dartitis" in darts to fit within the yips literature (Honeyball, 2004; Masters, 1992; Roberts et al., 2013). This inclusive approach is important to ensure other sports where the yips is prevalent are researched, as the systematic review highlighted that of the 30 yips papers reviewed, 23 focussed on golf.

The thesis provides novel insight into the experience of the yips and choking, and the similarities between both forms of paradoxical performance. However, a recent review highlighted the lack of clarity between what constitutes a yips or a choke (Lobinger et al., 2014) in the literature research. Clark et al. (2005) reported one key difference between the yips and choking, was that chokers are still able to make rational decisions and chose the correct path for successful performance, but performance is hindered by psychological factors, whereas the yips stem for an uncontrollability of physical movement, which can be worsened by psychological distress. This proposal would suggest that yips are not caused by anxiety factors, but can be effected by them. However, both the yips and severe choking share a number of similarities in the psychological symptoms experienced (Bennett et al., 2015; chapter three; Guicciardi et al., 2010). Therefore, a key difference in choking and particularly type-II and type-III yips stems from the severity of the psychological symptoms experienced. For instance, Lobinger et al. (2014) proposed that the yips may be a conditioned reaction to many previous choking experiences or one significant emotion-laden choking experience. This was based on the observation that choking is characterised by an acute incident (i.e., one off) and the yips may represent a more chronic form of choking (Klampfl et al., 2013a; Lobinger et al., 2014). Although the current thesis supports the role of severity as a difference between the yips and choking, it cannot support the role of time, i.e., acute v chronic, as time was not measured. However, Marquardt’s (2009) vicious cycle model may provide support for how a choking experience could lead to a conditioned yips response (See figure 6.1). That is, if an individual believes that they have a problem after a severe choke or multiple chokes, they may attempt to control their movements that leads to interference between automatic and controlled action (as seen in CPH), which, in turn, leads to an uncontrolled condition response. However, this approach was not supported within the findings of chapter five, but does provide a plausible explanation why performance deteriorates. Therefore, future research should investigate the role of time (acute vs chronic) and severity in longitudinal studies with athletes, as a way of testing both time and severity as differentiating factors between the two forms of paradoxical performance.

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Figure 6-1: *Marquardt’s (2009) vicious cycle involved in the development of the yips*

As highlighted in the systematic review, there were issues with Smith et al.’s (2003) yips continuum model, for example it specificity to golf. Further, few studies have incorporated Smith et al.’s model into the methodological approach (c.f. Stinear et al., 2006; Rotherham et al., 2012). This may be due to the lack of clarity for those who do not meet type-I and type-II yips-affected classifications. For instance, of the 72 yips-affected golfers recruited in the original Smith et al. (2003) study, 14 golfers reported experiencing both psychological and physical symptoms, yet were not classified. This failure to classify athletes is problematic, given the importance of the symptomology, and suggests that classifying athletes is not as simple as classifying type-I and type-II. Further, qualitative accounts revealed that the majority of athlete’s experience both physical and psychological symptoms simultaneously (e.g., Bawden & Maynard, 2001), which was also seen in study two of this thesis. Therefore, the systematic review proposed a refined two-dimensional model that incorporates a type-III criterion (See figure 6.1). This model proposes that athletes may experience both psychological and physical symptoms, with differing severities, allowing for a greater comparison between the types of yips to occur.

The appropriateness of this model was tested in studies three and four of this thesis. These studies took an alternative approach to that adopted by Smith et al. (2003), who classified athletes based on the description of the yips experience. In chapters four and five, a symptom checklist was utilised, that was created based on the accounts of yips-affected athletes in study two and previous qualitative literature (Bawden & Maynard, 2001; Bennett et al., 2015; Philippen & Lobinger, 2012) alongside the findings revealed in the systematic review. The symptom checklist included a total of 20 symptoms (10 psychological and 10 physical/neuromuscular). Of the 74 separate athletes (study three n =61; study four n = 13) who completed the checklist, only three did not include any symptoms but this was due to not completing the online form (study three). Consequently, participants were classified as being either type-I (physical symptoms only), type-II (psychological symptoms only) or type-III (combination of psychological and physical symptoms). The studies in chapters four and five supported the proposal developed from chapter two and three, that the majority of athletes experienced a combination of physical and psychological symptoms, evidenced in the spread of the sample: 56 were classified as type-III, eight were classified as type-II and the remaining seven were classified as type-I. Of those 56 type-III yips affected participants, there was a range of those who experienced different severities (amount of symptoms experienced) of both psychological and physical symptoms, although this was not explored in the current thesis. This approach to classification based on symptomology may provide a more robust method than relying on the description of the yips alone as symptoms may highlight symptoms they may not highlight in their descriptions.

The validity of the two dimensional model was tested in both chapter four and five. However, due to the small sample size recruited in study four (*n* =13), a test for the validity of the model would have not been powered appropriately. Chapter fours findings revealed initial support for this model, as there were a number of significant differences in trait measures between those type-I (*n* =7), type-II (*n* =6) and type-III athletes (*n* =45). The largest differences were witnessed between the type-I and type-III groups for 12 variables, and the type-II and type-I groups for four variables. This provides an initial argument that psychological predictors may play a greater role in those who experience the yips, where psychological symptoms manifest (type-II or type-III). This is particularly interesting given that the majority of the differences in the predictors stemmed from social facets such as perfectionistic self-promotion, non-display of imperfection and non-disclosure of imperfection. However, given the low sample sizes in the type-I and type-II groups, these conclusions are only speculative. As such future research should endeavour to recruit greater numbers of type-I and type-II yips-affected (*n* >20). Given the high prevalence rate of type-III yips, in comparison to other sub-groups, future research should look at the difference in the severity of the symptoms experienced in this type. For instance, classifying the type-III into a further three sub-groups; those who experience more severe psychological symptoms, those who experience more severe physical symptoms and those who experience both severe psychological and physiological symptoms. In future work, adopting both of these approaches will allow for a greater understanding of the different classifications highlighted in the yips models from chapter two.

The findings from this thesis, in particular in chapter four, suggest that the two dimensional yips-model proposed in chapter two may be amended to be more inclusive of other forms of paradoxical performance (See figure 6.2). For instance, when the classification criteria (physical symptoms only, psychological symptoms only and both) was applied to both choking and the yips individuals, the findings revealed a number of differences in trait measures between the three groups, particularly between the group who experienced both symptoms, and those who experienced just physical symptoms particularly for public self-consciousness. These findings support the suggestion by Mesagno and Marchant (2013) that there may be differences in types of choking experienced by those who experience high levels of private and public self-consciousness respectively. As such, future research needs to test the applicability of this model in understanding the experience of different forms of paradoxical performance (yips and choking). This model has the potential to help practitioners to be able to diagnose and treating yips-affected athletes, particularly using Lobinger et al.'s (2014) three step model for diagnosing paradoxical performance.

Given the nature of the current thesis in proposing a new model, identifying potential predictors and testing potential mechanisms, the applied implications will be discussed using the three stages of diagnosing athletes who experience paradoxical performances (Lobinger et al., 2014). These three stages include: explorative, examination and measures. The first stage of the three stage model is where the two-dimensional model will be most beneficial as it focuses on the practitioner gaining an understanding of the individual's experience of the paradoxical performance, exploring the individual's interpretation, previous experience, symptoms experienced and how they have tried to cope with this before. This will be discussed in greater detail in the applied implications section.

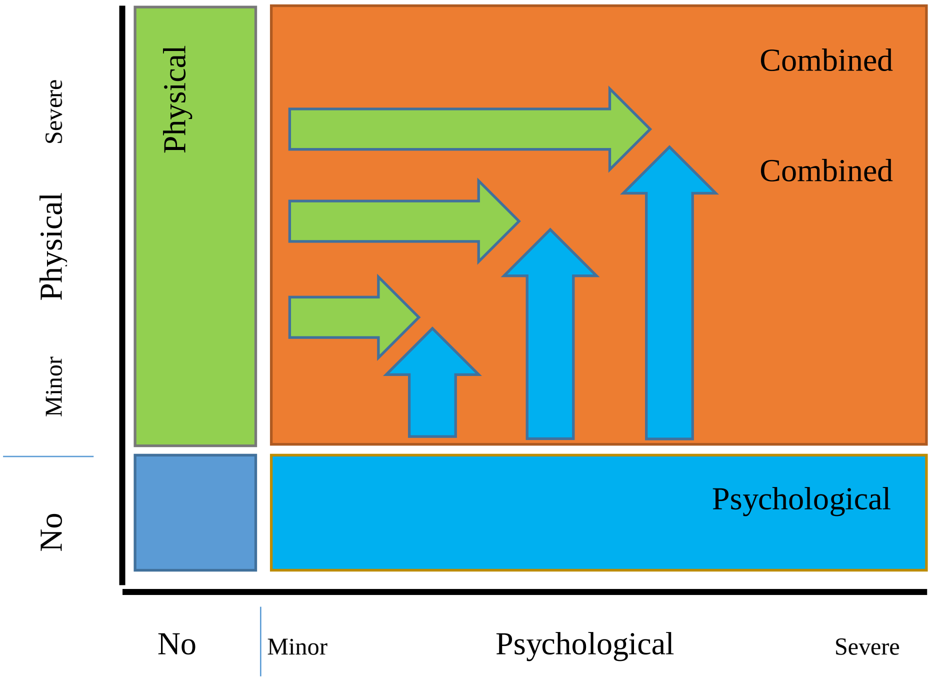

Figure 6-2: *Proposed new two-dimensional model for paradoxical performance*

6.3.2 Aim Two

The second aim of the thesis was to investigate the potential predictors associated with the yips and choking. Over the course of this thesis, and from recent reviews (Hill et al., 2010a; Lobinger et al., 2014), three key characteristics were highlighted and assessed as potential predictors associated with both choking and the yips. These were anxiety, perfectionism and perfectionistic self-presentation. The importance of anxiety in both yips and choking is well documented (Lobinger et al., 2014). For instance, high anxiety is particularly prevalent in choking and both type-II and type-III yips, while type-I symptoms are exacerbated under high pressure symptoms (McDainel et al., 1989; Sachdev, 1992; Smith et al., 2000). With this in mind, early yips researchers proposed that although anxiety may play a role in the mechanisms of performance deterioration, it was not considered a cause of these yips symptoms (Sachdev, 1992; Smith et al., 2000). However, previous qualitative research (e.g., Bennett et al., 2014) including chapter three, revealed that good performance also occurred under high anxiety, and that interpretation or sensitivity to these symptoms may be a key factor for those susceptible to experiencing the yips and choking.

Anxiety sensitivity is believed to be a stable trait-like characteristic that influences an athlete's interpretation of state anxiety (Schmidt et al., 1997). Within chapter four of this thesis, all three forms of anxiety sensitivity (physical, cognitive and social) acted as predictors of those susceptible for choking, yet this was not the case for yips. This supports the potential difference between the yips and choking, and that sensitivity may play a key role in the acute experience of choking, rather than a chronic condition of the yips (Lobinger et al., 2014). However, those who were type-III yips-affected experienced higher levels of social anxiety interpretation than those who were type-I yips-affected, supporting the importance of social factors in those who are susceptible to experience the yips; this was reported in the yips predicative model in chapter four.

Early consensus within the yips literature suggested that the yips are a physical condition that can be exacerbated by anxiety (Scahdev, 1992). However, the current thesis findings suggest that anxiety sensitivity or interpretation may act as a potential predictor of choking, as well as type-III yips. These findings coupled with the previous literature suggest that the yips are multi-etiological and anxiety may in fact be both a cause and an effect of both the yips and choking (Lobinger et al., 2014). This is pertinent given that recent research within musician's dystonia suggests that trait anxiety and focal dystonia are manifestations of the same neuropsychiatric disorder, particularly focussing on the role of neural activity associated with the basal ganglia (Enders et al., 2011; Ron, 2009). This highlights that high levels of trait anxiety or psychological traits may potentially act as a cause of these uncontrollable movements. Thus, future research is warranted in order to understand the role that potential predictors play in explaining yips behaviour; using a range of psychological and neurological measures.

A novel finding within this thesis focuses on the role of individuals striving to create the perfect image in the eyes of others in the susceptibility of experiencing the yips and choking. In study two, the archers indicated that apprehension associated with negative evaluation in pressure performance, was a potential trigger for their experience of both paradoxical performances. This was also evident in other qualitative accounts of both yips and choking (Bennett et al., 2015; Guiccardi et al., 2010). These findings provided novel insight into the intensity of the self-presentational and self-consciousness concerns experienced by this calibre of athlete (international elite athletes) in both choking and the yips. For example, one archer in the chapter three revealed "*I am on the Olympic team and suddenly I have to be better than I was before"* whilst another felt "*I had that sense of I can't be seen to be missing the target here because, you know everyone expects me to win sort of thing, everyone thinks I am the best here"*. Thus, athletes may strive to portray a perfect image but feel they were unable to, which serves as a major source of their anxiety and self-consciousness when they were performing.

Within chapter four, both perfectionistic self-promotion and non-display of imperfection were highlighted as potential predictors of the yips, but only non-display of imperfection was highlighted as a potential predictor of choking. Furthermore, all three forms of perfectionistic self-presentation were significantly higher in those type-III and type-II yips-affected athletes compared to those type-I affected. This suggests that individuals striving to present a perfect image may be more susceptible to experiencing the psychological components associated with performance under pressure. Interestingly when this was tested in chapter five of this thesis the findings were inconclusive, as the final study did not reveal any differences between these predictors in the paradoxical performances of those yips-affected and unaffected. However, given the potential implications of the pressure environment created and that no participants experienced the yips during the study, perfectionistic self-presentation may still play an important role in understanding performance under pressure.

Interestingly, study three also revealed that social anxiety was a key predictor of yips experience. This is pertinent as perfectionistic self-promotion and non-display of imperfection are linked with social anxiety and as such may play a key role in understanding performance under pressure (Fleet, Coultoer, & Hewitt, 2012; Hewitt et al., 2003; 2008; Nepon et al., 2011). Fleet and Hewitt (2014) proposed an expanded model of perfectionism and social anxiety (see figure 6.3) with perfectionism factors such as perfectionistic self-presentation, perfectionistic rumination and perfectionism discrepancies as potential predictors of social anxiety. Furthermore, these self-presentational concerns have also been linked with frequent intrusive automatic thoughts about the need to be perfect, which contribute to an increase in social anxiety (Sturman, 2011). Intrusive thoughts have not been investigated specifically in the yips, although Bennett et al. (2016) found that type-I yips-affected athletes experience significantly higher levels of rumination than those unaffected. Therefore, this relationship between rumination with social anxiety and perfectionistic self-presentation warrants further investigation, given the importance of social factors as potential predictors of the yips as highlighted in chapter three and four of this thesis.

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Figure 6-3: *Fleet and Hewitt’s (2014) proposed model of Perfectionism and Social Anxiety*

The final predictor in Fleet and Hewitt’s (2014) model is perfectionistic discrepancies, which are associated with general perfectionism. Previous literature has highlighted that a number of maladaptive perfectionism traits have been linked with the experience of the yips (Roberts et al., 2013) and type-I specifically (Bennett et al., 2016). However, in chapter four, these general perfectionism traits were associated with choking and not the yips. Yet, perfectionism was different between the yips classification types, where type-III yips-affected athletes experienced significantly higher levels of doubts about actions and concern over mistakes then those type-I affected athletes, both of which are identified as maladaptive forms of perfectionism. Furthermore, in study four, perfectionistic concerns or strivings were not associated with the yips or choking behaviour. As such, this thesis highlights the role of perfectionism in increasing the susceptibility to experiencing the yips and choking.

These perfectionism discrepancies may also relate to the role of perfectionistic strivings and concerns as tested in chapter five. Research has highlighted that perfectionistic strivings can be beneficial for performance (Stoeber et al., 2009; Kaye et al., 2008) and linked with lower levels of anxiety and self-confidence (Stoeber, Otto, Pescheck & Stoll, 2007). However, if this drive for perfection evolves into a demand for perfection, then perfectionistic strivings may be considered unhealthy and maladaptive (Lundh et al., 2008). This unhealthy and maladaptive perfectionism is evidenced in individuals who have high levels of both perfectionistic strivings and concerns. Research suggests that individuals who are high in both perfectionistic strivings and concerns may experience a greater decrement on performance efficiency and effectiveness (Roberts et al., 2013; Sagar & Stoeber, 2009; Stoeber & Otto, 2006). Accordingly, it is important that those individuals who exhibit higher levels of perfectionistic strivings are able to control the negative reactions associated with imperfection (i.e., perfectionistic concerns) in order to experience lower levels of anxiety and higher levels of self-confidence (Stoeber et al., 2007). Particularly as the findings of chapter five revealed a significant positive relationship between perfectionistic strivings and concerns, yet this relationship was not accounted for or investigated and so this may provide an explanation for a deterioration in performance under pressure. Future research should investigate this relationship within paradoxical performances and examine the role of these factors associated with Fleet and Hewitt's model (figure 6.2) along with its applicability in understanding both forms of paradoxical performance.

This thesis also highlighted the important role that confidence may play in the experience of both forms of paradoxical performance. In chapter three, the archers reported that confidence was a key factor in whether an individual experienced target-panic or not. One archer even suggested that if you have confidence you do not have target-panic. Yet the current thesis did not investigate this further as a potential predictor, for practical reasons given the range of other measures administered and the likelihood of participants experiencing survey fatigue. However, self-confidence has been identified as a key ingredient for elite level success (Hays et al., 2009), and is also as an essential quality for athletes to possess to help protect against the potentially debilitative effects of anxiety in pressure situations (Hanton et al., 2004). Accordingly, future research should further investigate the role of confidence as a potential predictor of choking and the yips.

6.3.3 Aim Three

The final aim of this thesis was to investigate the potential mechanisms associated with the yips and choking. Throughout this thesis, two mechanisms were identified that potentially provide an explanation as to why performance deteriorates under high-pressure environments: these are self-focus and distraction. In chapter five, a competitive high-pressure environment was created to induce choking and yips symptoms. From a self-focus perspective, reinvestment was measured by the variability in kinematic variables within archery and golf between low and high-pressure environments. The findings from this study revealed that there was no difference in variability in any of the performance kinematics. However, given that none of the participants in chapter five experienced a choke or yip, it was unsurprising that none of the performance variables changed. A potential explanation for why a yip or choking experience did not occur may be down to the simplicity of the task, and consequent lack of ecological validity for a high pressure performance scenario for highly skilled athletes, as highlighted in chapter five. Within chapter five there was an increase in cognitive and somatic anxiety and a more negative interpretation of confidence from the low to high pressure trials, suggesting that the study was successful at creating a pressure environment. However, the trait activation theory (Tett & Burnett, 2003) proposes that, individuals will interact with their situation based on the make-up of their traits. As social predictors were influential in the susceptibility of both choking and the yips in chapter four, in retrospect, chapter five could have included more social cues such as a crowd etc. when creating the pressure environment. This may have afforded a stronger test of the importance of traits in pressure environments and understanding both forms of paradoxical performance.

The current study did not find any differences in the kinematic variables, other studies focusing on yips have found changes in a range of kinematic variables (Klampfl et al., 2014; Philippen et al., 2014) suggesting that conscious processing may provide an explanation for why performance deteriorates. However, studies that have investigated the role of reinvestment in the experience of the yips, have yielded inconclusive findings (Bennett et al., 2016; Klampfl et al., 2013a). For instance, Klampfl et al. (2013) found that reinvestment was not linked with yips behaviour in 19 yips-affected golfers, whereas, Bennett et al. (2016) found that 15 type-I yips-affected golfers experienced significantly higher levels of reinvestment in golfers, darts players and cricketers when compared to those unaffected. A limitation of these studies is the lack of consistency in the classification of those participants, as Klampfl et al. does not identify what type of yips classification the 19 golfers were, and so their failure to find differences may be due to the multi-etiological nature of the yips. In chapter five, the yips-affected athletes are classified, (type-III = 11, type- II = 2; type-I = 0), but due to low numbers, no specific analysis between the classifications was conducted. Therefore, future research needs to adopt a similar multidisciplinary approach in testing the potential of self-focus models and the role of reinvestment within the experience of sufficient number of type-I, type-II and type-III yips affected athletes.

The third study also investigating the role of distraction models by using the ACT (Eysenck & Derakshan, 2011) as a potential explanation for paradoxical performance. It was expected that under high-pressure those who experienced a paradoxical performance would increase the level of mental effort invested due to the increased pressure and difficulty of the task. Although nobody in study three experienced a yip or choke during the trials, those who experienced both forms of paradoxical performance reduced their levels of mental effort in the high-pressure trial compared to those unaffected. A potential explanation for this may be that the individuals who have previously experienced either form of paradoxical performance, learned to cope more effectively with pressured situations (Hill & Shaw, 2013). For instance, those paradoxical performance-affected athletes may be desensitised to the pressure situation and adopt a more approach-focussed coping strategy to help manage the emotional distress associated with evaluation apprehension (Bennett et al. 2015; Hill & Shaw, 2013; Toering, Elferink-Gemser, Jordet, Jorna, Pepping, & Visscher, 2011). This coping strategy coupled with the lack of task difficulty may have meant that the athletes did not need as much mental effort for successful performance compared to those who had not experienced paradoxical performance before. Alternatively, chapter two findings suggested that an individual's perception of the situation as a challenge or a threat, played a key role on their performance. Due to the potential lack of difficulty of the task, individuals may have seen the task as a challenge rather than a threat and therefore were able to use their mental resources in a more effective fashion (Bawden & Maynard, 2001; Jones et al., 2009; Philippen & Lobinger, 2011). This notion is supported by the high level of level of confidence reported in the high pressure trial. The role of both challenge and threat states and coping styles in paradoxical performance warrants further investigation.

This thesis has not provided support for either self-focus or distraction models as an explanation for paradoxical performances. Yet this may be due to a range of potential limitations associated with the environment. As choking and yips occur in very specific situations, the ecological validity of a lab-based environment may compromise the opportunity to test these mechanisms effectively. Future research should test these mechanisms in real competitive environments. In doing so, a greater understanding of the mechanisms associated with paradoxical performances may be achieved.

6.4 Practical Implications

In this section the main applied implications which arose from this programme of research will be discussed. These findings will be discussed using Lobinger et al.'s (2014) three stages of diagnosing paradoxical performance. These three stages include: explorative, examination and measures. The first stage focuses on the practitioner gaining an understanding of the individual's experience of the paradoxical performance and their interpretation of this. In addition to exploring previous experience, practitioners investigate symptoms experienced and how they have tried to cope with this before. The criteria checklist developed in this thesis may potentially help guide practitioners to achieve a clearer picture of the symptoms experienced. The checklist in the current thesis was completed 215 times in total (141 with athletes who experience choking, 74 on yips). Only 13 participants did not report any symptoms on the checklist (10 with choking and 3 with yips). However, the use of an online questionnaire afforded recruitment of one of the largest samples of studies investigating the yips and choking predictors in terms of sample size (n = 155) who completed a large numbers of measures. As such, this allowed for the effective testing of the two-dimensional model, demonstrating that this model may be an effective tool for practitioners to use when diagnosing paradoxical performance. In addition, future research can utilise the model to define categories of those paradoxical-affected athletes. Moreover, the model will allow practitioners to tailor the next two stages of Lobinger's diagnosis more efficiently.

The next phase of Lobinger's model is the examination phase, which focusses on assessing the situations in which the affected symptoms occur (e.g., in the presence of the ball in golf). In chapter three, the findings provided novel insight into the conditions target-panic manifests in, suggesting it can influence two aspects of the release phase of the shot in early release of the arrow, or jerking movement on release. Chapter five was unable to test the situations effectively as none of the archers or the golfers experienced a yip during the study. As such, practitioners should consider assessing these symptoms in real life environments where these symptoms are likely to occur. For example, the current study highlights that societal pressure plays a key role in the experience of yips symptoms, and as such should be considered when creating environments to investigate these symptoms.

The final stage of the model is measurement, which involves the collection of other forms of data including physiological, psychological, neurological and kinematic measures. This stage is particularly important as the current thesis highlighted that both the yips and choking are multi-faceted involving interactions of several emotional, cognitive, attentional, neuromuscular, kinematic and situational components (Guicciardi et al., 2010; Lobinger et al., 2014). Thus, practitioners utilising the paradoxical performance symptom checklist may be able to tailor their approach as there are a plethora of different measures available to use. However, as seen in the review in chapter two, there is a limited amount of empirical data that has investigated the different approaches (psychological, neurological, physiological etc.) simultaneously. Therefore, practitioners should look to use a multi-method approach to understanding the experience of both forms of paradoxical performance, which will allow for a greater theoretical underpinning thus allowing for effective interventions to developed and administered.

There are a number of interventions that may be administered to athletes who experience a paradoxical performance, depending on the different symptoms identified within the diagnoses stages, such as solution-focussed guided imagery (See Lobinger et al., 2014 for a review). The thesis highlights the key role that social anxiety and perfectionistic self-presentation play in the athlete's experience of paradoxical performances, especially the yips. Therefore, a potential intervention for these forms of paradoxical performances should be tailored to influence this. Hofmann (2007) developed a psychological maintenance model and specifies that "social apprehension is associated with unrealistic social standards and a deficiency in selecting attainable social goals" (p.193). Hofmann's model also reports that socially anxious individuals when placed in threatening or challenging environments display a range of tendencies that promote their ability to cope by engaging in safety or avoidance behaviour in order to evade social mishaps (Fleet & Hewitt, 2014). With this in mind an intervention such as social self-reappraisal therapy for social phobia, may warrant investigation (Hofmann & Scepkowski, 2006). This involves the individual with high levels of social anxiety being placed in situations where they make mistakes and create mishaps purposely. This will allow the individuals to reduce their estimations of the social costs that follow social mistakes (Fang, Sawyer, Asnaani, & Hofmann, 2013). Therefore, future research should investigate the role of this as an intervention for those who experience type-II and type-III particularly.

6.5 Strengths and Limitations

There are a number of strengths and limitations to the research detailed within this thesis. Many of these have been discussed at length within the preceding experimental study and systematic review chapters of this thesis. However, there were also a number of strengths and limitations throughout the thesis, which warrant discussion, including the use of a mixed methodology and issues with measures and conceptualisation.

One of the main strengths of this thesis is the mixed-methods approach utilised. This approach allowed for the participants' experiences of paradoxical performance to be explored and consequently allowed for a quantitative investigation to be conducted using variables derived from these athlete's experiences. In order to adequately capture the experiences of elite level athletes it was necessary to explore this qualitatively. For example, the role of perfectionistic self-presentation as a potential predictor of both the yips and choking experiences was not discussed in previously literature, nor would it have been identified without the inclusion of a mixed methodology; allowing for a novel, and deeper understanding of the yips and choking.

There are two key limitations that warrant further discussion regarding the yips literature and approach adopted in the current thesis, referring to the conceptualisation and measurement of the yips. With regards to conceptualisation, there is still debate about what constitutes a type-II yip and a choking experience. Although the current thesis has reported some subtle differences (i.e. the role of perfectionistic self-presentation and control) between the two phenomena, there are also a number of similarities (i.e. anxiety, self-consciousness etc.) that make it difficult to distinguish. This is further evidenced by Lobinger et al. (2014) who proposed that the yips may be a conditioned reaction to many previous choking experiences or one significant emotion-laden choking experience. This was based on the observation that choking is characterised by an acute incident (i.e., one off) and the yips may represent a more chronic form of choking (Klampfl et al., 2013a; Lobinger et al., 2014). As such, further research is needed to understand fully the clear differences in the conceptualisation of the yips and choking. Once this is established, future research will be able to confidently and effectively study comparison. Moreover, future research should highlight the definitions they have used to categorise the yips and choking experiences, therefore allowing the reader to understand how they have defined the two phenomena.

The issue with conceptualisation may also stem from how the yips and choking are measured. The main debate within the research concentrates on the two approaches adopted for yips measurement: subjective (self-report) vs objective (kinematic screening). Within the literature to date, the yips prevalence rate estimated by kinematic screening are considerably lower than those who have adopted a self-report approach (Klampfl et al., 2015; McDaniel et al., 1989, Smith et al., 2000). This may be because of the potential limitations of self-report measures and the inconsistencies in the different kinematic screening protocol (Klampfl et al. 2015). To date, studies which have used self-report as a classifier of the yips, have done so with the inclusion of a yes/no response of “have you ever experienced the yips” (McDaniel et al., 1989). Classification of the yips could therefore not only differ from study to study, but in addition, self-report measures rely on the truthful response of the participant, and allows potential for individuals to wrongfully classify themselves as yips-affected. It could be argued, however, if an individual believes they are experiencing the yips, this can instigate intense cognitive rumination and psychological trauma associated with type-II yips. In light of this, although the current thesis adopted a predominately subjective approach, we included a symptom checklist to provide more rigour when classifying yips-affected athletes to a particularly sub-type and provide more information on the symptoms the athletes attributed to their perceived yips, instead of relying on a yes/no question of "have you ever experienced the yips".

Those studies which have adopted a more structured kinematic screening process (Klampfl et al., 2015; Marquardt, 2009) have used a range of kinematic indicators of putting performance, and the observation of obvious jerks and tremors as the classification of the yips. Although this provides a more scientific approach to classification, the focus pertains to the physical symptoms of the yips only, which are particularly pertinent with type-I yip. These studies also used this classification in a low pressure environment; yet physical symptoms have been shown to be more prevalent in high-pressure environments (Bawden & Maynard, 2001; Bennett et al., 2014). Moreover, psychological implications of the yips, a key factor in type-II and type-III yips, may not be accounted for by kinematic screening.

Both the classification and measurement of the yips have been highlighted as key causes for the lack of consistency in the literature to date, as highlighted in chapter two and previous reviews (Lobinger et al., 2014). The current thesis has attempted to provide clarity regarding the conceptualisation of the yips with the proposal of the two-dimensional yips model in chapter two. Which the remaining experimental studies have provided initial evidence to support its validity as a model to differentiate the yips sub-types. Although there are strengths and limitations to both approaches of yips classification (self-report and kinematic measurements), research cannot compare and contrast findings, as those athletes who self-report yips may be different to those yips-affected athletes identified through kinematic screening. Consequently, given the remit of this thesis, no conclusion on the most effective approach for classifying athletes as type-I, type-II or type-III can be proposed. Therefore, it is essential that future research should aim to obtain self-report measures and kinematic data simultaneously to uncover the reliability of each method, and further test the validity of the two-dimensional yips model.

6.6 Concluding Remarks

To conclude, it is proposed that the aims of this research programme to examine the predictors and mechanisms associated with two forms of paradoxical performance in the yips and choking have been achieved. Due to the increased popularity of research in the yips and the lack of any review prior to this thesis, study one provided a systematic review of all the literature up to the end of the year 2013, providing a new definition and two-dimensional model of the yips and paradoxical performance. The second study provided novel insight into the lived experience of target-panic and choking in the highest calibre of athletes within the sport of archery, revealing the potential role of self-presentation perfectionism as a novel predictor to both forms of paradoxical performance. These findings were further supported as potential predictors for both yips and choking with the development of yips and choking predictive models where social factors such as social anxiety and self-consciousness heavily featured. The final study provides some insight into those athletes who had previously experienced the yips and choking and the role of mental effort although no one experienced the yips or choking symptoms during performance.

It is believed that this thesis made a complementary advancement in our understanding of both forms of paradoxical performance with the proposal of a new two-dimensional yips model; and the role of different anxiety, perfectionism and social based traits of potential predictors on increasing the susceptibility of both the yips and choking. This thesis also provides first insight into the potential role of perfectionistic self-presentation in the experience of paradoxical performance, especially when performing in front of crowds. Finally, this thesis has proposed a symptom checklist that may help practitioners classify athletes more effectively in the symptoms they experience, to provide a greater theoretical underpinning for the proposal of interventions.

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Appendices

Appendix A- Study 2 Information Sheet/ Consent Form

Participant Information Sheet

Main Investigator:

Mr Philip Clarke, Dr Sally Akehurst and Prof. David Sheffield

Study Title:

Understanding an Elite Archers Thoughts, Feelings and Emotions When Performing

Study Location and Timing:

Participants will arrange a time for their testing, which is convenient to them and the experimenter.

Overview of Study:

The research is interested in the difference in emotions felt by elite archers before, during and after performance and training. Participants are asked to partake in an interview that will be kept confidential and all data will be coded for anonymity and viewed only by the researchers.

Possible Risks and Discomforts:

A risk assessment has been conducted for this study and ethical approval provided by the University of Derby. Some of the content discussed may be upsetting to some participants and therefore, participants will be provided as much time to answer a question as needed and are free to not answer if preferred. Please note, this risk has been considered low.

Confidentiality:

Data collected may be reported in journal articles and/or presentations, however, personal information will be treated in the strictest confidence and no association will be made between participants' identities and the data collected.

Additional information:

You are free to withdraw from the study at any time without providing an explanation. Your can remove your results from the study up to 2 months after the interview. Your results will be made available to you on request at the end of the study.

If you have any queries please do not hesitate to ask questions.

I agree to take part in the study:
Understanding an Elite Archers Thoughts, Feelings and Emotions When Performing

---

Name (please print): ______________________ Date: __________

Signature: ______________________ D.O.B. __________

Witnessed By: Name (please print): ______________________

Signature: ______________________

Appendix B- Study 2 Interview schedule

<u>Interview Guide Plan:</u>

The focus of this study is to gain an understanding of your thoughts, feelings and emotions during performance. The questions that will be asked during the interview will relate to your experience of a good performance, a poor performance where you performed below your expectations, and target-panic performances. We will also discuss your routines before during and after performance.

1. **How are you today?**

2. **How did you get into the sport?**

3. **How long have you been competing?**

4. **What techniques do you use to practise your game?**
    a. *Technical and psychological*

5. **When you're training do you use any specific psychological skills?**

6. **Can you identify the sorts of thoughts related to the performance of your skill?**
    a. *So can you just explain this in more detail?*
    b. *So can you describe these in a bit more detail? / Please elaborate further?*
7. **What is the importance of these thoughts?**

8. **Could you explain to me the characteristics of a good performance that you have experienced?**
    a. *Psychological, physical, technical*

9. **What are your thoughts prior to performing at a competition when you're in good form?**
    a. *Can you think of any other significant thoughts?*
    b. *What are you perceptions of these thoughts?*

10. **What are your feelings and emotions prior to performing at a competition when you're in good form?**
    a. *Can you think of any other significant feelings and emotions?*
    b. *What are you perceptions of these feelings and emotions?*

11. **What are your thoughts during performance at a competition when you're competing well?**
    a. *Can you think of any other significant thoughts?*
    b. *What are you perceptions of these thoughts?*

12. **What are your feelings and emotions during performance at a competition when you're competing well?**
    a. *Can you think of any other significant feelings and emotions?*
    b. *What are you perceptions of these feelings and emotions?*

13. **What are your thoughts after performance at a competition when you have competed well?**
    a. *Can you think of any other significant thoughts?*
    b. *What are you perceptions of these thoughts?*

14. **What are your feelings and emotions after performance at a competition when you have competed well?**
    a. *Can you think of any other significant feelings and emotions?*
    b. *What are you perceptions of these feelings and emotions?*

15. **During these experiences do you use any psychological techniques?**

16. **After a good performance does it impact your training?**

17. **Could you explain to me the characteristics of a poor performance that you have experienced?**
    a. *Psychological, physical, technical*

18. **What are your thoughts prior to performing at a competition when you're performing below your expectations?**
    a. *Can you think of any other significant thoughts?*
    b. *What are you perceptions of these thoughts?*

19. **What are your feelings and emotions prior to performing at a competition when you're performing below your expectations?**
    a. *Can you think of any other significant feelings and emotions?*
    b. *What are you perceptions of these feelings and emotions?*

20. **What are your thoughts during performance at a competition when you're performing below your expectations?**
    a. *Can you think of any other significant thoughts?*
    b. *What are you perceptions of these thoughts?*

21. **What are your feelings and emotions during performance at a competition when you're performing below your expectations?**
    a. *Can you think of any other significant feelings and emotions?*
    b. *What are you perceptions of these feelings and emotions?*

22. **What are your thoughts after performance at a competition when you have performed below your expectations?**
    a. *Can you think of any other significant thoughts?*
    b. *What are you perceptions of these thoughts?*

23. **What are your feelings and emotions after performance at a competition when you have performed below your expectations?**
    a. *Can you think of any other significant feelings and emotions?*
    b. *What are you perceptions of these feelings and emotions?*
24. **During these experiences do you use any psychological techniques?**

25. **After a poor performance does it impact your training?**

26. What are your views or understanding of the target panic?

27. What been your greatest memory within the sport?

28. What's your highest achievement within the sport?

29. How many hours a week would you practise?

30. When's your next performance?

31. When was your first experience of Target Panic?
  a. *Condition before the dystonia*
  b. *What symptoms did you experience?*
  c. *Was it competition of practise?*
  d. *How much pressure were you under?*

32. What were your perceptions of this experience?

33. Did you reflect after your initial experience?

34. What your perceptions after the first experience during performance?
  a. *Thoughts and emotions*
  b. *The way you approached the shot?*
  c. *Competition or practise?*

35. Length of time experiencing the yips?

36. What was the difference between a poor performance and a yip?

Appendix C- Study 2 Debrief

Participant Debrief Sheet

Main Investigator:

Mr Philip Clarke, Dr Sally Akehurst and Prof. David Sheffield

Study Title:

Understanding an Elite Archers Thoughts, Feelings and Emotions When Performing

Overview of Study:

The research is interested in the difference in thoughts, feelings and emotions felt by athletes who have experienced symptoms of the target panic, choking and good performance using elite level archers. These findings will be used to inform future studies that will test potential predictors and mechanisms associated with both target panic and choking, so that we are can gain a greater understanding of these two phenomenon.

Confidentiality:

Data collected may be reported in journal articles and/or presentations, however, personal information will be treated in the strictest confidence and no association will be made between participants' identities and the data collected.

Additional information:

You are free to withdraw from the study at any time without providing an explanation. Your can remove your results from the study up to 2 months after the interview. Your results will be made available to you on request at the end of the study.

Appendix D- BFNE-II

Listed below are a group of statements. Please rate your agreement with each of the statements using the following scale. If you think it is not all characteristic of me, click,0, if you think it is extremely characteristic of you, click 4, if you feel somewhere in between, click any one of the numbers between 0 and 4. If you feel neutral or undecided the midpoint is 2.

No	Question	0	1	2	3	4
1	I worry about what other people will think of me even when I know it doesn't make any difference					
2	It bothers me when people form an unfavourable impression of me					
3	I am frequently afraid of other people noticing my shortcomings					
4	I worry about what kind of impression I make on people					
5	I am afraid that others will not approve of me					
6	I am concerned about other people's opinions of me					
7	When I am talking to someone, I worry about what they may be thinking about me					
8	I am usually worried about the impression I make					
9	If I know someone is judging me, it tends to bother me					
10	Sometimes I think I am too concerned with what other people think of me					
11	I often worry about that I will say or do wrong things					
12	I worry about what other people will think of me even when I know it doesn't make any difference					

Appendix E- ASI-III

Listed below are a group of statements. Please rate your agreement with each of the statements using the following scale. If you think very little, click 0, if you think very much, click 4, if you feel somewhere in between, click any one of the numbers between 0 and 4. If you feel neutral or undecided the midpoint is 2.

No	Question	0	1	2	3	4
1	It is important for me not to appear nervous					
2	When I cannot keep my mind on a task, I worry I might be going crazy					
3	Its scares me when my heart beats rapidly					
4	When my stomach is upset, I worry that I might be seriously ill					
5	it scares me when I am unable to keep my mind on a task					
6	When I tremble in the presence of others I fear what people might think of me					
7	When my chest feels tight I get scared that I won’t be able to breathe properly					
8	When I feel a pain in my chest I worry I’m going to have a heart attack					
9	I worry that other people will notice my anxiety					
10	When I feel "spacey" or spaced out I worry that I may be mentally ill					
11	It scares me when I blush in front of people					
12	When I notice my heart skipping a beat, I worry that there is something seriously wrong with me					
13	when I begin to sweat in a social situation, I fear people will think negatively of me					
14	When my thoughts speed up I worry that I might be going crazy					
15	When my throat feels tight, I worry that I could choke to death					
16	When I have trouble thinking clearly, I worry that there is something wrong with me					
17	I think it would be horrible for me to faint in public					
18	When my mind goes blank, I worry that there is something terribly wrong with me					

Appendix F- FMPS

Listed below are a group of statements. Please rate your agreement with each of the statements using the following scales. If you disagree strongly, click 1, if you agree strongly, click 5, if you feel somewhere in between, click any one of the numbers between 1 and 5. If you feel neutral or undecided the midpoint is 3.

No	Question	1	2	3	4	5
1	As a child, I was punished for doing things less than perfect					
2	It is important to me that I be thoroughly competent in everything I do					
3	I am a neat person					
4	If I fail at work/school I am a failure as a person					
5	I set a higher goals than most people					
6	If someone does a task at work/school better than I, then I feel like I failed the whole task					
7	If I fail partly, it is as bad as being a complete failure					
8	Even when I do something very carefully, I often feel that it is not quite right					
9	I have extremely high goals					
10	My parents have expected excellence from me					
11	I never felt like I could meet my parents expectations					
12	If I do not as well as other people, it means I am an inferior human being					
13	Other people seem to accept lower standards from themselves than I do					
14	My parents have always had a higher expectations for my future than I have					
15	I try to be a neat person					
16	I usually have doubts about the simple everyday things					
17	Neatness is very important to me					
18	I expect higher performance in my daily tasks than most people do					
19	I am an organized person					
20	I tend to get behind in my work because I repeat things over and over					
21	The fewer mistakes I make, the more people will like me					
22	I never felt like I could meet my parents standards					

Appendix G- PSPS

Listed below are a group of statements. Please rate your agreement with each of the statements using the following scales. If you disagree strongly, click 1, if you agree strongly, click 7, if you feel somewhere in between, click any one of the numbers between 0 and 4. If you feel neutral or undecided the midpoint is 4.

No	Question	1	2	3	4	5	6	7
1	It is okay to show others that I am not perfect							
2	I judge myself based on the mistakes I make in front of other people							
3	I will do almost anything to cover up a mistake							
4	Errors are much worse if they are made in public rather than in private							
5	I try always to present a picture of perfection							
6	It would be awful if I made a fool of myself in front of others							
7	If I seem perfect, others will see me more positively							
8	I brood over mistakes that I have make in front of others							
9	I never let others know how hard I work on things							
10	I would like to appear more competent than I really am							
11	It doesn’t matter if there is a flaw in my looks							
12	I do not want people to see me do something unless I am very good at it							
13	I should always keep my problems to myself							
14	I should solve my own problems rather than admit them to others							
15	I must appear to be in control of my actions at all times							
16	It is okay to admit mistakes to others							
17	It is important to act perfectly in social situations							
18	I don’t really care about being perfectly groomed							
19	Admitting failure to others is the worst possible thing							
20	I hate to make errors in public							
21	I try to keep my faults to myself							
22	I do not care about making mistakes in public							
23	I need to be seen as perfectly capable in everything I do							
24	Failing at something is awful if other people know about it							
25	It is very important that I always appear to be “on top of things”							
26	I must always appear to be perfect							
27	I strive to look perfect to others							

Appendix H- SCS

Please read each of the statements below very carefully and then click the number on the scale that is most representative of you. There are no right or wrong answers so please answer as honestly and as accurately as possible. Please rate your agreement with each of the statements using the following scale. If you think extremely uncharacteristic, click 0, if you think extremely characteristic, click 4, if you feel somewhere in between, click any one of the numbers between 0 and 4. If you feel neutral or undecided the midpoint is 2.

No	Question	0	1	2	3	4
1	I’m always trying to figure myself out					
2	I’m concerned about my style of doing things					
3	Generally, I’m not aware of myself					
4	It takes time to overcome my shyness in new situations					
5	I reflect a lot about myself					
6	I’m concerned about the way I present myself					
7	I’m often the subject of my own fantasies					
8	I have trouble working when someone is watching me					
9	I never scrutinise myself					
10	I get embarrassed easily					
11	I’m self-conscious about the way I look					
12	I don’t find it hard to talk to strangers					
13	I’m generally attentive to my inner feelings					
14	I usually worry about making a good impression					
15	I’m constantly examining my motives					
16	I feel anxious when I speak in front of a group					
17	One of the last things I do before I leave my house is look in the mirror					
18	I sometimes have the feeling that I am off somewhere watching myself					
19	I’m concerned about what other people think of me					
20	I’m alert to changes in my mood					
21	I’m usually aware of my appearance					
22	I’m aware of the way my mind works when I work through a problem					
23	Large groups make me nervous					

Appendix I- BFI-10

How well do the following statements describe your personality? Please rate your agreement with each of the statements using the following scale. If you disagree strongly, click 1, if you agree strongly, click 5, if you feel somewhere in between, click any one of the numbers between 0 and 4. If you neither agree nor disagree the midpoint is 3.

No	Question	1	2	3	4	5
1	I see myself as someone who is reserved					
2	I see myself as someone who is generally trusting					
3	I see myself as someone who tends to be lazy					
4	I see myself as someone who is relaxed, handles stress well					
5	I see myself as someone who has few artistic interests					
6	I see myself as someone who is outgoing, sociable					
7	I see myself as someone who tends to find fault with others					
8	I see myself as someone who does a thorough job					
9	I see myself as someone who gets nervous easily					
10	I see myself as someone who has an active imagination					

Appendix J- PCOSES

Using the following scale, please answer these questions with regard to target panic. Please respond with regard to how you have felt since the event. If you strongly disagree, click 1, if you disagree somewhat click 2, if you agree somewhat click 3 and if you strongly agree, click 4.

No	Question	1	2	3	4
1	I could have done something to prevent this event from happening				
2	There's isn't much I can do to help myself feel better about the event				
3	How I deal with this event now is under my control				
4	There is nothing I could have done to prevent this event from occurring				
5	I don't have much control over my emotional reactions to the event				
6	I can do things to make sure I will not experience a similar event in the future				
7	When I am upset about the event, I can find a way to feel better				
8	This event happened because of something I did or didn't do				
9	I have control over my day-to-day reactions to this event				
10	There is nothing I can do to prevent a similar event from happening again				
11	There isn't much I can do to keep the event from affecting me				
12	I didn't have any control over the event occurring				
13	I have control over how I think about the event				
14	I have no control over whether a similar even happens to me again				
15	I couldn't have prevented it				
16	My reaction to the event in snot under my control				
17	There are things I can do to reduce the risk that a similar event will happen again				

Appendix K- Study 3 Online Informed Consent

Participant Information Sheet

Invitation to take part

Hi I'm Philip, a researcher at the University of Derby currently looking at the psychological characteristics associated with elite performance. It will take around 25 minutes to complete so if you interested in taking part please follow this link

Online consent form

Thank-you for being interested in taking part in this study investigating the psychological characteristics associated with elite performance. This study will involve answering several questionnaires. In order to take part you need to have competed at national level or higher and be over the age of 18. The questionnaires will take approximately 25 minutes to complete.

The study is being conducted as part of a PhD thesis by Philip Clarke (p.clarke@derby.ac.uk) with the date being used in the write up and possible future publication. The project is under the supervision of Dr. Sally Akehurst (S.akehurst@derby.ac.uk) and Prof. David Sheffield (D.Sheffield@derby.ac.uk) at the University of Derby. Only the research team will have access to this information. The Data will be kept for 5 years after the research has been conducted.

At any point during the study and up to 4 weeks from taking part you can request to withdraw, If you choose to withdraw, any data you have contributed will be removed and destroyed. You can do this during the study itself by stopping and requesting to withdraw (by emailing p.clarke@derby.ac.uk) or by contacting the researcher by email after taking part stating you would like your data removed from the study.

It is important to ensure your data is kept anonymous. To do this a unique identifier code is needed. To create your unique identifier, use the first 3 letters of the month of your birth followed by the last 3 digits of your phone number (e.g. jan123) and enter it here:

If you click the consent button, you are consenting that you are over 18, competed at least national level, and understand the English language.

If you understand what participating will involve and you are happy to take part please tick this box

Appendix L- Study 3 Debrief

Online Debrief

Thank you for taking part in this online study, it is hoped you found it to be an interesting and enjoyable experience. For your reference please write your unique identifier code in the box below. Your code is made up of the first 3 letters of your month of birth and the last 3 digits of your phone number:

During the study you will have answered questionnaires designed to look at the following psychological characteristics: fear of negative evaluation, perfectionism, self-presentation, anxiety sensitivity, personality and self-consciousness. If you have experienced the yips (target panic) then you would have completed some demographic questions and a questionnaire of perceived control. The aim of the research is to investigate relationships between these characteristics and yips behaviour, but also look at differences.

If you are concerned about any of the issues that have been brought up through completing this study you can get support from HCPC registered psychologists (http://www.hcpc-uk.org.uk/) or your GP.

It may be the case that you no longer wish to be a part of the research. If this is the case, you can ask for your data to be removed and not included in the study. To do this you can contact the researcher directly within 4 weeks of taking part by email:

Researcher – Philip Clarke

Email –p.clarke@derby.ac.uk

If you have any further questions about the study you can contact the lead researcher above or email Dr. Sally Akehurst (S.akehurst@derby.ac.uk) or Prof. David Sheffield (D.Sheffield@derby.ac.uk). All the data from the study will be kept for five years and then it will be destroyed.

Thank you once again for taking part.

Appendix M- Chapter 4 Additional Results Data

Data on number of participants in each group

The number of individuals in yips-affected who have experienced the yips and those who have not.

Sport	Yips - Yes	Yips - No
Golf	23	7
Archery	21	10
Total	44	17

Additional Data on Level of Competition:

Choking

Another factor reported was the athlete's highest level of competition experienced (school/university, club, county, national and international; See table below). A Mann-Whitney test indicated that there was no significant difference in experience at the highest level competed at between the two groups U= 2085.5, p = .069, although the yes groups had 12.45 (SD=11.36) years and the no group had 9.84 (SD= 8.84) years at the top level.

Demographic information for number of athletes at highest experience level for choking

	Highest Level					
	School/Uni	Club	County	National	International	Total
Choking				*n*		
Yes	4	33	24	17	27	105
No	2	28	10	2	8	50
Total	6	61	34	19	35	155

Yips

The athlete's highest level of competition experience (school/university, club, county, national and international) was recorded (See table 4.4). A Mann-Whitney test indicated that there was no significant difference in experience at the highest level competed at between the two groups U= 2750.5, p = .836, with 10.3 (SD= 11.32) years at top level for the yes group and 9.29 (SD= 8.73) years at the top level for the no group.

Demographic information for number of athletes at highest experience level by yips

	Highest Level					
	School/Uni	Club	County	National	International	Total
Yips			*n*			
Yes	1	17	17	10	16	61
No	5	44	17	9	19	94
Total	6	61	34	19	35	155

Additional Data on DFA analyses:

Choking

The Standardized canonical discriminant function coefficients and the correlations between the observed variables

	Standardized Canonical Discriminant Function Coefficient	**Structure Matrix**
	Function	
Characteristic	1	1
Physical concerns	-0.17	0.38
Cognitive concerns	.25	0.54
Social concerns	-0.21	0.37
Fear of negative evaluation	0.2	0.49
Conscientiousness	-0.57	-0.57
Private self-consciousness	0.51	0.63
Non-display of imperfection	-0.13	0.48
Concern over mistakes	0.29	0.57
Parental expectations	0.39	0.62
Doubts about actions	-0.16	0.5

The predicted number of people in each group based on the proposed model

	Predicted Group membership		
Choking	Yes	No	Total
Yes	91 (86.7%)	14 (13.3%)	105 (100%)
No	31 (62%)	19 (38%)	50 (100%)

Yips

The Standardized canonical discriminant function coefficients and the correlations between the observed variables

	Standardized Canonical Discriminant Function Coefficient	Structure Matrix
	Function	
Characteristic	1	1
Conscientiousness	-0.59	0.73
Social Anxiety	0.39	0.73
Non-display of imperfection	-0.01	-0.67
Perfectionistic self-promotion	0.52	0.59

The predicted number of people in each group based on the proposed model

	Predicted Group membership		
Yips	Yes	No	Total
Yes	27 (44.3%)	34 (55.7%)	61 (100%)
No	14 (14.9%)	80 (85.1%)	95 (100%)

Additional Data on the Symptoms:

Symptoms and Yips Type

A Chi square test of independence revealed an association between sport for eight variables including: uncontrollable movement of limbs; loss of control of limbs; jittery; can't control thought process; nerves and anxiety; and increased negativity. Golfers were more likely to experience the above physical and psychological symptoms than those in archery when experiencing the yips.

Choking and Yips group combined

Based on the previous yips model (chapter two; Smith et al, 2003), three sub-groups were created to see if there was a difference in symptoms for paradoxical performances. These three groups included; physical symptoms only (n = 8), psychological symptoms only (n= 34), and those who experienced both (n= 111). The table below identifies the frequency of the symptoms experienced by all the yips and choking-affected athletes. A Chi square test of independence revealed an association between 15 of the symptoms and the three groups including: jerks; freezing; spasms; uncontrollable movement of limbs; loss of control of limbs; precision; jittery; self-conscious; can't control thought process; nerves and anxiety;

can't focus; unable to make a decision; negativity and self-critical. Those who experienced both psychological and physiological symptoms were more likely to experience all the symptoms.

A Chi square test of independence revealed an association between seven of the symptoms and the sports including; uncontrollable movement of limbs; loss control of limbs; jittery; can't control thought process; nerves and anxiety; unable to focus and self-critical. Golfers were more likely to experience the above physical and psychological symptoms than those in archery when experiencing paradoxical performances.

MANOVA for all groups data

In order to ensure we did not use the same individual twice in the analysis, we used all those yips-affected athletes and the remaining athletes who experienced a choke. The final sample included 59 yips-affected athletes and 53 choking-affected athletes. A 3 (type = physical, psychological and both) x 2 (sport = golf & archery) MANOVA examined main effects and interactions between these independent variables (IVs) and 20 dependant variables (DV's; subscales of BFNE, BFI-10, SCS, ASI, PSPS and FMPS). The results revealed that there was a significant multivariate main effect for symptom type $F(40, 176) = 2.08$, p = 0..001, Wilk's λ= 0.46, partial $\eta^2 = .32$; no significant multivariate main effect for sport $F(20, 88) = 1.25$, $p = 0.23$, Wilk's λ= 0.78, partial $\eta^2 = .22$ and no significant interaction between sport and symptom type $F(20, 88) = 1.56$, $p = .08$, Wilk's λ= 0.74, partial $\eta^2 = .26$.

Symptom Type

Univariate analyses found that types of symptoms experienced had a statistically significant effect on 13 variables which included physical concerns; social concerns; fear of negative evaluation; conscientiousness; neuroticism; private self-consciousness; public self-consciousness; social anxiety; non-display of imperfection; non-disclosure of imperfection; perfectionistic self-promotion; concern over mistakes and doubts about actions. See table below for a list of the means, standard deviations, F values and partial η^2 for the 20 variables.

Follow up post-hoc analysis revealed that the group experiencing both the psychological and physical symptoms experienced significantly higher levels of social concerns $p = .005$; fear of negative evaluation $p = .005$; private self-conscientiousness $p = .027$; public self-conscientiousness $p = .029$; social anxiety $p = .046$; non-display of imperfection $p < 0.001$; non-disclosure of imperfection $p = .002$; perfectionistic self-promotion $p = .005$; concern over mistakes $p = .001$; doubts about actions $p = .007$ and significantly lower levels of conscientiousness $p = .043$ than those athletes who experienced physical symptoms alone. The group who experienced both physical and psychological symptoms also experienced significantly higher levels of physical concerns $p = .012$; social concerns $p = .025$; neuroticism $p = .023$; non-display of imperfection $p = .007$; perfectionistic self-promotion $p = .029$; concern over mistakes $p = .006$; doubts about actions $p = .0013$ and significantly lower levels of conscientiousness $p = .025$ than those who experienced psychological symptoms only. Finally, the post-hoc analysis revealed that those who experienced psychological symptoms experienced higher levels of non-display of imperfection $p = .007$ and non-disclosure of imperfection $p = .005$.

Frequency and Chi-Square results for symptoms across yips groups and archery and golf

Symptoms	Sport	Type-I (*n*=7)	Type-II (*n* =6)	Type-III (*n* =45)	Total (*n*=58)	X^2 (Type)	X^2 (Sport)
		Yips Type *n*				Chi-Square	
Jerks	*Archery*	4	0	7	11	8.33*	6.11*
	Golf	0	0	21	21		
	Total	4	0	28	32		
Tremors	*Archery*	1	0	4	5	3.52	2.01
	Golf	0	0	10	10		
	Total	1	0	14	15		
Spasms	*Archery*	0	0	3	3	4.69	3.52
	Golf	0	0	9	9		
	Total	0	0	12	12		
Freezing	*Archery*	3	0	8	11	3.43	.41
	Golf	0	0	9	9		
	Total	3	0	17	20		
Uncontrollable movement of limbs	*Archery*	0	0	3	3	7.43*	9.48**
	Golf	0	0	14	14		
	Total	0	0	17	17		
Loss control of limbs	*Archery*	1	0	7	8	12.18***	9.03**
	Golf	0	0	20	20		
	Total	1	0	27	28		
Loss of precision	*Archery*	2	0	11	13	7.48*	.01
	Golf	0	0	13	13		
	Total	2	0	24	26		
Sweating	*Archery*	0	1	4	5	2.56	.338
	Golf	0	0	7	7		
	Total	0	1	11	12		
Butterflies	*Archery*	1	1	6	8	3.66	1.6

Symptoms	Sport	Type-I (*n*=8)	Type-II (*n*=6)	Type-III (*n*=45)	Total (*n*=59)	X^2 (Type)	X^2 (Sport)
		Yips Type *n*				Chi-Square	
Self-Conscious	*Archery*	0	2	11	13	13.34***	2.04
	Golf	0	0	19	19		
	Total	0	2	30	32		
Can't control thought process	*Archery*	0	0	8	8	14.46***	6.29*
	Golf	0	0	18	18		
	Total	0	0	26	26		
Nervous and anxiety	*Archery*	0	3	8	11	11.41**	6.11*
	Golf	0	0	21	21		
	Total	0	3	29	32		
Can't focus	*Archery*	0	1	9	10	7.49*	1.45
	Golf	0	1	14	15		
	Total	0	2	23	25		
Unable to make decision	*Archery*	0	1	5	6	5.18	2.59
	Golf	0	0	12	12		
	Total	0	1	17	18		
Threatening	*Archery*	0	1	3	4	4.67	6.27*
	Golf	0	0	13	13		
	Total	0	1	16	17		
Increased negativity	*Archery*	0	0	14	14	34.65***	5.08*
	Golf	0	1	22	23		
	Total	0	1	36	37		
Self-critical	*Archery*	0	2	12	14	12.3**	.42
	Golf	0	0	17	17		
	Total	0	2	29	31		
	Archery	0	0	6	6	4.19	1.19

	Golf	0	0	13	13		
	Total	0	1	19	20		
Jittery	*Archery*	1	0	5	6	6.72*	5.23*
	Golf	0	0	15	15		
	Total	1	0	20	21		

Can control emotions	*Golf*	0	1	9	10
	Total	0	1	15	16

*Chi-square is significant at the 0.05 level **Chi-square is significant at the 0.01 level ***Chi-square is significant at the $p < 0.001$ level

Frequency and Chi-Square results for symptoms across yips and choking groups combined and archery and golf

Symptoms	Sport	Type-I (n=8)	Type-II (n =34)	Type-III (n =111)	Total (n=153)	X^2 (Type)	X^2 (Sport)
		Symptom type					
		n				p value	
Jerks	*Archery*	4	0	17	21	20.9***	.88
	Golf	0	0	28	28		
	Total	4	0	45	49		
Tremors	*Archery*	1	0	14	15	11.01**	.16
	Golf	0	0	14	14		
	Total	1	0	28	29		
Spasms	*Archery*	0	0	8	8	8.706*	.65
	Golf	0	0	12	12		
	Total	0	0	20	20		
Freezing	*Archery*	3	0	14	17	12.89**	.05
	Golf	0	0	17	17		
	Total	3	0	31	34		
Uncontrollable movement of limbs	*Archery*	0	0	5	5	11.31**	9.628**
	Golf	0	0	20	25		
	Total	0	0	25	30		
Loss control of limbs	*Archery*	1	0	17	18	26.23***	5.694**
	Golf	0	0	34	34		
	Total	1	0	51	52		
Loss of precision	*Archery*	2	0	33	35	37.47***	.716
	Golf	0	0	32	32		
	Total	2	0	65	67		
Sweating	*Archery*	0	3	9	12	2.93	.06
	Golf	0	1	13	14		
	Total	0	4	22	26		
Butterflies	*Archery*	1	2	10	13	5.63	4.38

Symptoms	Sport	Type-I (n=8)	Type-II (n=34)	Type-III (n=111)	Total (n=153)	X^2 (Type)	X^2 (Sport)
		Symptoms type					
		n				p value	
Self-Conscious	*Archery*	0	6	22	28	12.25**	2.53
	Golf	0	4	36	40		
	Total	0	10	58	68		
Can't control thought process	*Archery*	0	3	16	19	7.801*	7.8**
	Golf	0	5	29	34		
	Total	0	8	45	53		
Nervous and anxiety	*Archery*	0	7	23	30	9.2**	5.49*
	Golf	0	9	38	47		
	Total	0	16	61	77		
Can't focus	*Archery*	0	4	18	22	6.96*	5.4*
	Golf	0	7	31	38		
	Total	0	11	49	60		
Unable to make decision	*Archery*	0	2	10	12	6.01*	1.05
	Golf	0	1	17	18		
	Total	0	3	27	30		
Threatening	*Archery*	0	3	6	9	4.47	2.97
	Golf	0	0	18	18		
	Total	0	3	24	27		
Increased negativity	*Archery*	0	6	29	35	15.31***	3.35
	Golf	0	8	41	49		
	Total	0	14	70	84		
Self-critical	*Archery*	0	7	33	40	10.44**	10.4**
	Golf	0	8	30	38		
	Total	0	15	63	78		
	Archery	0	3	13	16	3.85	2.45

	Golf	0	2	24	26			Can control emotions	*Golf*	0	5	21	26
	Total	1	4	34	39				Total	0	8	34	42
Jittery	*Archery*	1	0	16	17	23.07***	4.7*						
	Golf	0	0	31	31								
	Total	1	0	47	48								

*Chi-square is significant at the 0.05 level **Chi-square is significant at the 0.01 level ***Chi-square is significant at the $p < 0.001$ level

Total Mean, SD, F value, Partial η2 for each variable for symptoms type

		Symptom type				
		Type-I	Type-II	Type-III	Type	
Variable	Sport		Means (SD)		*F* value	Partial η^2
Fear of negative evaluation (BFNE-II)	*Archery*	26.87 (10.16)	36.92 (11.95)	39.53 (12.72)	5.73**	0.01
	Golf	0	33.86 (13.49)	42.84 (12.08)		
	Total	26.87 (10.16)	35.33 (12.62)	41.47 (12.38)		
Neuroticism (BFI-10)	*Archery*	2.24 (.53)	2.11 (1.08)	2.97 (.92)	4.34*	0.08
	Golf	0	2.64 (1.05)	2.97 (.99)		
	Total	2.24 (.53)	2.39 (1.08)	2.97 (.95)		
Extraversion (BFI-10)	*Archery*	3.19 (1.22)	3 (1.32)	2.89 (1.03)	0.19	0.004
	Golf	0	3.11 (1.06)	3.24 (.82)		
	Total	3.19 (1.22)	3.06 (1.17)	3.09 (1)		
Agreeableness (BFI-10)	*Archery*	3.5 (.38)	3.46 (.88)	3.3 (.8)	0.23	0.004
	Golf	0	3.43 (.81)	3.43 (.7)		
	Total	3.5 (.38)	3.44 (.82)	3.38 (.74)		
Conscientiousness (BFI-10)	*Archery*	4.37 (.92)	4.04 (.88)	3.56 (.84)	8.02***	0.13
	Golf	0	4.43 (.7)	3.68 (.81)		
	Total	4.37 (.92)	4.24 (.8)	3.63 (.82)		
Openness (BFI-10)	*Archery*	3.56 (.98)	3.31 (1.03)	3.67 (.83)	0.03	0.001
	Golf	0	3.75 (.78)	3.34 (.84)		
	Total	3.56 (.98)	3.54 (.92)	3.48 (.85)		
Private Self-Consciousness (SCS)	*Archery*	2.56 (.58)	3.1 (.54)	3.05 (.55)	3.18*	0.06
	Golf	0	2.97 (.44)	3.14 (.58)		
	Total	2.56 (.58)	3.03 (.49)	3.1 (.57)		
Public Self-Consciousness (SCS)	*Archery*	2.64 (.99)	2.86 (.97)	3.21 (.76)	3.42*	0.06
	Golf	0	3.15 (.68)	3.56 (.78)		
	Total	2.64 (.99)	3.02 (.83)	3.42 (.79)		
Social Anxiety (SCS)	*Archery*	2.81 (.47)	3.09 (.53)	3.18 (.55)	3.39*	0.06
	Golf	0	3.02 (.62)	3.51 (.72)		
	Total	2.81 (.47)	3.06 (.57)	3.37 (.67)		
Physical Concerns (ASI-III)	*Archery*	1.46 (.5)	1.6 (.91)	1.68 (.74)	3.85*	0.07
	Golf	0	1.42 (.5)	2.3 (.98)		
	Total	1.46 (.5)	1.51 (.72)	2.05 (.93)		
Cognitive Concerns (ASI-III)	*Archery*	1.48 (.55)	1.72 (1.36)	1.65 (.84)	1.87	0.03
	Golf	0	1.52 (.57)	2.34 (1.01)		
	Total	1.48 (.55)	1.62 (1.02)	2.05 (1)		
Social Concerns (ASI-III)	*Archery*	1.85 (.9)	2.71 (1.11)	2.61 (.82)	6.54**	0.1
	Golf	0	2.05 (.8)	3.06 (.83)		
	Total	1.85 (.9)	2.36 (1)	2.87 (.85)		
Non-Display of Imperfection (PSPS)	*Archery*	2.54 (.9)	3.70 (1.25)	4.17 (.9)	12.74***	0.19
	Golf	0	3.78 (.68)	4.6 (1.02)		

	Total	2.54 (.9)	3.74 (.98)	4.42 (.99)		
Non-Disclosure of Imperfection (PSPS)	*Archery*	3.3 (.82)	4.19 (.88)	4.17 (.67)	5.11**	0.09
	Golf	0	4.10 (.73)	4.41 (.8)		
	Total	3.3 (.82)	4.14 (.79)	4.32 (.75)		
Perfectionistic Self-Promotion (PSPS)	*Archery*	3.25 (.61)	4.02 (.1.11)	4.16 (.95)	6.46**	0.11
	Golf	0	3.61 (.59)	4.48 (.98)		
	Total	3.25 (.61)	3.81 (.88)	4.35 (.97)		
Concern Over Mistakes (FMPS)	*Archery*	1.5 (.43)	2.15 (1.29)	2.77 (1.01)	9.99***	0.16
	Golf	0	2.06 (.8)	2.73 (.77)		
	Total	1.5 (.43)	2.1 (1.05)	2.75 (.88)		
Organisation (FMPS)	*Archery*	3.44 (.89)	3.4 (.94)	3.15 (.88)	0.977	0.02
	Golf	0	3.73 (.78)	3.49 (.9)		
	Total	3.44 (.89)	3.57 (.86)	3.35 (.9)		
Personal Standards (FMPS)	*Archery*	3.45 (.62)	3.58 (.93)	3.69 (.84)	0.79	0.02
	Golf	0	3.46 (.85)	3.72 (.75)		
	Total	3.45 (.62)	3.52 (.88)	3.71 (.79)		
Parental Expectations (FMPS)	*Archery*	1.73 (.69)	2.63 (.98)	2.26(.98)	2.07	0.04
	Golf	0	1.99 (1.02)	2.47 (.91)		
	Total	1.73 (.69)	2.3 (1.04)	2.38 (.94)		
Doubts About Action(FMPS)	*Archery*	2.04 (.63)	2.51 (.92)	2.86 (.72)	7.12***	0.12
	Golf	0	2.36 (.76)	2.99 (.8)		
	Total	2.04 (.63)	2.43 (.83)	2.94 (.77)		

* Significant at the 0.05 level ** Significant at the 0.01 level *** Significant at the $p < 0.001$ level

<u>Differences in Yips Sub Types</u>

<u>Correlational Data</u>

Correlations were conducted to see if there were any significant relationships between the yip demographics (type, severity, age, handicap, and highest level) and perceived control. There were issues with normality ($p > 0.05$), skewness and kurtosis: as such a non-parametric Spearman's correlation was conducted. The correlation coefficients for all the variables are reported in table 4.15. The key findings reported that yips type and severity were strongly and positively correlated r_p (56) = .503, $p < 0.001$). The severity and time since last experience had a moderately positive relationship r_p (54) = .369, $p = 0.01$, whereas severity and golf handicap had a moderately negative relationship r_p (29) = -.429, $p = 0.018$). Age, and time in total experiencing the yips, had a moderately positive relationship (r_p (32) = .474, $p = 0.005$. Finally, past control had a moderately positive relationship with both present control r_p (57) = .382, p = 0.003 and future control r_p (57) = .363, p = 0.005. There were no other significant relationships identified.

MANOVA

A 3 (type = type-I, type-II & type-III) x 2 (sport = golf & archery) MANOVA examined main effects and interactions between the independent variables (yips type and sport) and 23 dependant variables (DV's; subscales of BFNE, BFI-10, SCS, ASI, PSPS, FMPS and PCOSES). The results revealed that there was a significant multivariate main effect for type F (46, 62) = 2.09, p = 0.003, Wilk's λ= 0.15, partial η^2 = .61; no significant multivariate main effect for sport F (23, 31) = .69, p = 0.82, Wilk's λ= 0.66, partial η^2 = .34, and no significant interaction between sport and symptom type F (23, 31) = .90, p = .6, Wilk's λ= 0.6, partial η^2 = .4. Univariate analyses exploring the effect of each of the dependant variables were then conducted.

Yips Type

Univariate analyses found that types of symptoms experienced by an individual has a statistically significant effect on 13 variables, which included: social concerns, fear of negative evaluation, conscientiousness, neuroticism, private self-consciousness, public self-consciousness, social anxiety, non-display of imperfection, non-disclosure of imperfection, perfectionistic self-promotion, concern over mistakes, doubts about actions, and past control. See table below for a list of the means, standard deviations, F values and partial η^2 for the 23 variables.

Follow up post-hoc analysis revealed that type-III yips-affected individuals experienced significantly higher levels of: social concerns p= .000, fear of negative evaluation p= .005, neuroticism p= .032, private self-conscientiousness p= .016, public self-consciousness p= .01, social anxiety p= .005, non-display of imperfection p< 0.001, non-disclosure of imperfection p< 0.001, perfectionistic self-promotion p= .001, concern over mistakes p= .001 and doubts about actions p= .002. In addition, they experienced significantly lower levels of conscientiousness p= .004 than those who were type-I yips-affected. The type-III yips-affected group also experienced significantly higher levels of social concerns p= .009 and past control p= .003 than those who were type-II yips-affected. Finally, the post-hoc analysis revealed that those who were type-II yips-affected experienced significantly higher: non-display of imperfection p= .004, non-disclosure of imperfection p= .004, perfectionistic self-promotion p= .026, and significantly lower levels of past control p= .049 than those who were type-I yips-affected.

Demographic information for the yips-affected athletes

			Yips type			
			Type-I (n=7)	Type-II (n= 6)	Type-III (n=45)	Total (n= 58)
Characteristic	Gender	Sport	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Gender	Male	*Archery*	2	0	2	4
		Golf	0	3	22	25
	Female	*Archery*	0	0	2	2
		Golf	0	1	5	6
	Total		2	4	31	37
Age (yrs)	Male	*Archery*	39.50 (9.19)	0	41 (29.69)	40.25 (17.97)
		Golf	0	51 (6.08)	41.91 (13.03)	43 (12.68)
	Female	*Archery*	0	0	39.5 (7.78)	39.5 (7.78)
		Golf	0	50	40.80 (15.96)	42.33 (14.76)
	Total		39.50 (9.19)	50.75 (4.992)	41.52 (13.59)	42.41 (12.93)
Time suffering (years)	Male	*Archery*	.75 (.35)	0	2.75 (3.18)	1.75 (2.17)
		Golf	0	8 (10.39)	9.29 (11.98)	9.12 (11.56)
	Female	*Archery*	0	0	0.2	0.2
		Golf	0	0.1	2.64 (2.75)	2.21 (2.66)
	Total		.75 (.35)	6.03 (9.36)	7.24 (10.56)	6.7 (10.07)
Severity	Male	*Archery*	4.5 (.71)	0	6.5 (.707)	5.5 (1.29)
		Golf	0	5.67 (3.22)	8.14 (2.2)	7.83 (2.41)
	Female	*Archery*	0	0	5	5
		Golf	0	3	7.8 (1.02)	7 (2.19)
	Total		4.5 (.71)	5 (2.94)	7.86 (2.03)	7.34 (2.35)

The correlation coefficients for each of the variables associated with the yips specifically

Characteristic	***Sport***	***Yips type***	***Severity***	***Time (Total)***	***Time (Since Last)***	***Age***	***Handicap***	***Past control***	***Present control***	***Future control***
Sport	------	------	.236	.214	------	.107	------	.153	.204	.236
Yips type		------	**.503****	.255	------	-.144	-.211	.171	.149	.166
Severity			------	.242	**.369****	-.129	**-.429***	.098	.240	.252
Time (Total)				------	-.216	**.474****	-.159	.205	-.025	.044
Time (Since Last)					------	.365	-.051	-.285	.104	-.117
Age						------	.039	-.124	-.256	-.065
Handicap							------	-.076	-.071	-272
Past control								------	**.382****	**.363***
Present control									-------	.204
Future control										------

Appendix N- SMPS-2

The purpose of the present questionnaire is to identify how individuals view certain aspects of their competitive experiences in sport. Please indicate the extent in which you agree or disagree with the following statements (Circle one response option to the right of each statement). The Sport-MPS requires participants to respond to each item on a 5-point scale ranging from ***strongly disagree*** (1) to ***strongly agree*** (5). There are no right or wrong answers so please don't spend too much time on any one statement, simply choose the answer that best describes how you view each item.

1. If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player.

1 2 3 4 5

2. Even if I fail slightly in competition, for me, it is as bad as being a complete failure.

1 2 3 4 5

3. I usually feel uncertain as to whether or not my training effectively prepares me for competition.

1 2 3 4 5

4. My parents set very high standards for me in my sport.

1 2 3 4 5

5. On the day of competition I have a routine that I try to follow.

1 2 3 4 5

6. I feel like my coach criticizes me for doing things less than perfectly in competition.

1 2 3 4 5

7. In competition, I never feel like I can quite meet my parents' expectations.

1 2 3 4 5

8. I hate being less than the best at things in my sport.

1 2 3 4 5

9. I have and follow a pre-competitive routine.

1 2 3 4 5

10. If I fail in competition, I feel like a failure as a person.

1 2 3 4 5

11. Only outstanding performance during competition is good enough in my family.

1 2 3 4 5

12. I usually feel unsure about the adequacy of my pre-competition practices.

1 2 3 4 5

13. Only outstanding performance in competition is good enough for my coach.

1 2 3 4 5

14. I rarely feel that my training fully prepares me for competition.

1 2 3 4 5

15. My parents have always had higher expectations for my future in sport than I have.

1 2 3 4 5

16. The fewer mistakes I make in competition, the more people will like me.

1 2 3 4 5

17. It is important to me that I be thoroughly competent in everything I do in my sport.

1 2 3 4 5

18. I follow pre-planned steps to prepare myself for competition.

1 2 3 4 5

19. I feel like I am criticized by my parents for doing things less than perfectly in competition.

1 2 3 4 5

20. Prior to competition, I rarely feel satisfied with my training.

1 2 3 4 5

21. I think I expect higher performance and greater results in my daily sport-training than most players.

1 2 3 4 5

22. I feel like I can never quite live up to my coach's standards.

1 2 3 4 5

23. I feel that other players generally accept lower standards for themselves in sport than I do.

1 2 3 4 5

24. I should be upset if I make a mistake in competition.

1 2 3 4 5

25. In competition, I never feel like I can quite live up to my parents' standards.

1 2 3 4 5

26. My coach sets very high standards for me in competition.

1 2 3 4 5

27. I follow a routine to get myself into a good mind-set going into competition.

1 2 3 4 5

28. If a team-mate or opponent (who plays a similar position to me) plays better than me during competition, then I feel like I failed to some degree.

1 2 3 4 5

29. My parents expect excellence from me in my sport.

1 2 3 4 5

30. My coach expects excellence from me at all times: both in training and competition.

1 2 3 4 5

31. I rarely feel that I have trained enough in preparation for a competition.

1 2 3 4 5

32. If I do not do well all the time in competition, I feel that people will not respect me as an athlete.

1 2 3 4 5

33. I have extremely high goals for myself in my sport.

1 2 3 4 5

34. I develop plans that dictate how I want to perform during competition.

1 2 3 4 5

35. I feel like my coach never tries to fully understand the mistakes I sometimes make.

1 2 3 4 5

36. I set higher achievement goals than most athletes who play my sport.

1 2 3 4 5

37. I usually have trouble deciding when I have practiced enough heading into a competition.

1 2 3 4 5

38. I feel like my parents never try to fully understand the mistakes I make in competition.

1 2 3 4 5

39. People will probably think less of me if I make mistakes in competition.

1 2 3 4 5

40. My parents want me to be better than all other players who play my sport.

1 2 3 4 5

41. I set plans that highlight the strategies I want to use when I compete.

1 2 3 4 5

42. If I play well but only make one obvious mistake in the entire game, I still feel disappointed with my performance.

1 2 3 4 5

Appendix O- RSME

Place a mark on the scale that you feel best represents the amount of MENTAL EFFORT you put into the trial you have just completed.

Indicate your level of

effort in column below

Not at all effortful **0**

75

Moderately effortful

150

Very effortful **150**

Appendix P- Choking Demographics

Demographics

Participant number					
Please complete the following questions:					
Q1	**What is your age?**				
Q2	**What is your gender?**	Male	Female	Other	
Q3	**What is your current handicap?**				
Q4	**What was your best handicap?**				
Q5	**How long have you been playing golf?**				
		Club	**University**	**County**	**National**	**International**
Q6	**Have you competed at any of the following levels?**					
Q7	**How long have you competed at each level?**					
Q8	**What caused the pressure during the putting trial?**					
Q9	**Have you ever experienced a dramatic drop in your performance that was out of your control?**	**Yes**	**No**			

Q10	**Did you experience any of the following symptoms?** Jerks Tremors Spasms Freezing Involuntary movement of limbs Loss of control Loss of precision with muscle coordination Increased sweating Intense butterflies Jittery Heightened self-consciousness Can’t control thought process Heightened nerves/anxiety Unable to focus Unable to make a decision Perceived threat Increased negativity Overly self-critical Difficulty in controlling emotions If Other please specify below	**Please tick each symptom that applies to you**

Appendix Q- Yips Demographics

Q1 Have you ever experienced the yips? Yes No

Q2	**Did you experience any of the following symptoms?**	**Please tick each symptom that applies to you**	**What symptoms did you experience?**	**Please tick each symptom that applies to you**
	Jerks		Heightened self-consciousness	
	Tremors		Can't control thought process	
	Spasms		Heightened nerves/anxiety	
	Freezing		Unable to focus	
	Involuntary movement of limbs		Unable to make a decision	
	Loss of control		Perceived threat	
	Loss of precision with muscle coordination		Increased negativity	
	Increased sweating		Overly self-critical	
	Intense butterflies		Difficulty in controlling emotions	
	Jittery		If Other please specify below	

Q3 How would you rate the severity of your yips on your performance out of 10? 1= no impact, 10 = severe impact

Q4	**Which part of your game was affected?**	**Please tick where appropriate**
	Driving	
	Chipping	
	Putting	

Q5 Are you currently suffering with the yips? Yes No

Q6 How long have you been suffering with the yips? **Please answer where appropriate**

Driving
Chipping
Putting

Appendix R- CSAI-2R

Modified Competitive Sports Anxiety Inventory –2

The effects of highly competitive sports can be powerful and very different among athletes. The inventory you are about to complete measures how you feel right now about competition. Please complete this inventory as honestly as you can. Sometimes athletes feel they should not admit to any nervousness, anxiety or worry they experience before competition because this is undesirable. Actually, these feelings are quite common, and to help us understand them, we want you to share your feelings with us openly. If you worry about competition or have butterflies or other feelings that you know are signs of anxiety, please indicate these feelings accurately on the inventory. Equally, if you feel calm and relaxed, indicate those feelings as accurately as you can. Your individual answers will not be shared with anyone and you will remain anonymous. We will be looking only at group responses.
Please remember that you are responding to how you feel right now about competition.

Completion instructions – please read through carefully before you complete the questions overleaf.
A number of statements that athletes have used to describe their feelings before competition are given overleaf.
Read each statement and then circle the appropriate number, in each of the sections, to the right of the **statement, to indicate how you feel right now.** There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answers that describe your feelings **right now**. For the **interpretation** section (section 2) ask yourself whether you regard the intensity of feeling that you are currently experiencing as positive or negative with respect to your performance in this competition. For example, if you circle 1 (*not at all*) on the intensity scale, then respond in relation to that feeling on the interpretation scale; that is, is your lack of concern a positive or negative thing? Similarly, if you respond *very much so* to Question 4, then your response on the interpretation scale should indicate whether you interpret these self-doubts positively or negatively.

	Section 1 – Intensity scale How intense is your current level of anxiety?				Section 2 – Interpretation scale What impact do you think your anxiety Intensity will have on your performance						
	Not at All	Somewhat So	Moderately So	Very much	Very Negative			Unimportant			Very Positive
1. I am concerned about this competition	1	2	3	4	-3	-2	-1	0	+1	+2	+3
2. I feel nervous	1	2	3	4	-3	-2	-1	0	+1	+2	+3
3. I feel at ease	1	2	3	4	-3	-2	-1	0	+1	+2	+3
4. I have self-doubts	1	2	3	4	-3	-2	-1	0	+1	+2	+3
5. I feel jittery	1	2	3	4	-3	-2	-1	0	+1	+2	+3
6. I feel comfortable	1	2	3	4	-3	-2	-1	0	+1	+2	+3
7. I am concerned that I may not do as well in this competition as I could	1	2	3	4	-3	-2	-1	0	+1	+2	+3
8. My body feels tense	1	2	3	4	-3	-2	-1	0	+1	+2	+3
9. I feel self-confident	1	2	3	4	-3	-2	-1	0	+1	+2	+3
10. I am concerned about losing	1	2	3	4	-3	-2	-1	0	+1	+2	+3
11. I feel tense in my stomach	1	2	3	4	-3	-2	-1	0	+1	+2	+3
12. I feel secure	1	2	3	4	-3	-2	-1	0	+1	+2	+3
13. I am concerned about choking under pressure	1	2	3	4	-3	-2	-1	0	+1	+2	+3
14. My body feels relaxed	1	2	3	4	-3	-2	-1	0	+1	+2	+3
15. I'm confident I can meet the challenge	1	2	3	4	-3	-2	-1	0	+1	+2	+3
16. I'm concerned about performing badly	1	2	3	4	-3	-2	-1	0	+1	+2	+3
17. My heart is racing	1	2	3	4	-3	-2	-1	0	+1	+2	+3
18. I'm confident about performing well	1	2	3	4	-3	-2	-1	0	+1	+2	+3
19. I'm concerned about reaching my goal	1	2	3	4	-3	-2	-1	0	+1	+2	+3
20. I feel my stomach sinking	1	2	3	4	-3	-2	-1	0	+1	+2	+3
21. I feel mentally relaxed	1	2	3	4	-3	-2	-1	0	+1	+2	+3
22. I'm concerned that others will be disappointed with my performance	1	2	3	4	-3	-2	-1	0	+1	+2	+3
23. My hands are clammy	1	2	3	4	-3	-2	-1	0	+1	+2	+3
24. I'm confident because I mentally picture myself reaching my goal	1	2	3	4	-3	-2	-1	0	+1	+2	+3
25. I'm concerned I won't be able to concentrate	1	2	3	4	-3	-2	-1	0	+1	+2	+3
26. My body feels tight	1	2	3	4	-3	-2	-1	0	+1	+2	+3

27. I’m confident of coming through under Pressure	1	2	3	4	-3	-2	-1	0	+1	+2	+3

Appendix S- Low Pressure Trial

For Golf:

You will now be asked to perform the same golf-putting task that you completed during your familiarisation. You will perform 20 randomised golf putts. 10 from 5 foot and 10 from 7 foot. The researcher will tell you from which distance to putt from for each shot. The researcher will also retrieve the golf balls and place them at the appropriate putting distance for you to putt. You will also receive a point for every successful shot made. There will be no further communication between yourself and the researcher throughout this trial.

For Archery:

You will now be asked to perform the same archery shooting task that you completed during your familiarisation. You will perform 3 blocks of 3 arrows. The researcher will also retrieve the arrows and place them at buckets at the shooting line after each block. You will have a total of 90 seconds to shoot each block. You will receive points depending on where the arrow lands on the target. There will be no further communication between yourself and the researcher throughout this trial.

Appendix T- High Pressure Trial

For Golf:

You will now be asked to perform the same golf-putting task that you completed during your previous 2 trials. You will perform 20 randomised golf putts. 10 from 5 foot and 10 from 7 foot. The researcher will tell you from which distance to putt from for each shot. The researcher will also retrieve the golf balls and place them at the appropriate putting distance for you to putt. You will also receive a point for every successful shot made. There will be no further communication between yourself and the researcher throughout the study. However, this time you will be video-recorded, and a copy of your video-tape will be sent to a national golfing coach to analyse your putting technique. To be successful in this trial you need to putt more than anyone else and must have the best putting technique. The putting technique that we are looking for is a smooth controlled execution; this is the technique that we want you to replicate throughout. You have also been randomly selected and placed into a team of 2 with another participant. Your team-member has already performed the task, and increased their score from the previous task by 30%. If you increase your score by at least 20%, you will both receive a monetary reward of £50. Therefore, the money depends on how well you perform. If you don't increase your score by at least 20%, then you or your partner will NOT receive the money. A leader-board is also positioned beside the putting green, and in the Kirtley building just outside the lab highlighting the top 5 skilled teams in the study. The leader-board will also display your individual scores. Therefore, if you let your team mate down and don't improve your score by at least 20% then people will see it. The leader-board will also be displayed in public at the university's main campus at Kedleston Road.

For Archery:

You will now be asked to perform the same archery shooting task that you completed your previous trials. You will perform 3 blocks of 3 arrows. The researcher will also retrieve the arrows and place them at buckets at the shooting line after each block. You will have a total of 90 seconds to shoot each block. You will receive points depending on where the arrow lands on the target. There will be no further communication between yourself and the researcher throughout the study. However, this time you will be video-recorded, and a copy of your video-tape will be sent to a national archery coach to analyse your shooting technique. To be successful in this trial you need to score higher than anyone else and must have the best shooting technique. The shooting technique that we are looking for is a smooth controlled execution; this is the technique that we want you to replicate throughout. You have also been randomly selected and placed into a team of 2 with another participant. Your team-member has already performed the task, and increased their score from the previous task by 30%. If you increase your score by at least 20%, you will both receive a monetary reward of £50. Therefore, the money depends on how well you perform. If you don't increase your score by at least 20%, then you or your partner will NOT receive the money. A leader-board is also positioned beside the shooting line, and in the Kirtley building just outside the lab highlighting the top 5 skilled teams in the study. The leader-board will also display your individual scores. Therefore, if you let your team mate down and don't improve your score by at least 20% then people will see it. The leader-board will also be displayed in public at the university's main campus at Kedleston Road.

Appendix U- Qualitative accounts of pressure conditions

Sport	Participant number	Pressure Definition
Golf	1	n/a
Golf	2	n/a
Golf	3	n/a
Golf	4	n/a
Golf	5	n/a
Golf	6	n/a
Golf	7	Focus lost by thinking externally about non related matters. Performance suffered
Golf	8	Knowing there was a leader board for everyone to see plus possibly letting down my partner
Golf	9	points scoring added pressure, failure and letting others down
Golf	10	Competition, being the best I could be. The challenge of not missing a single putt. Making sure I didn't embarrass myself, a low handicap being its own pressures.
Golf	11	The Unknown
Golf	12	Didn't feel under any pressure. I had accepted what was going to happen. Was a little anxious as id fail to meet the high standard set in phase 1 of the test.
Golf	13	money and leader board
Golf	14	the audio file created the pressure when it added point and leader board, plus the heart rate monitor made it more pressure and the questionnaire made me think a lot more
Golf	15	Blocked the pressure intentionally, concentrated on breathing easily and feeling relaxed
Golf	16	Not wanting to embarrass myself so it improved pressure
Golf	17	missing putts id expect to hole
Golf	18	Thought of letting unknown partner down
Golf	19	Failure at previous putt and implication in score for partner
Golf	20	Leader board, technique. Not wanting to finish at the bottom
Golf	21	Expectation of my performance level
Golf	22	Wanting to give 100%
Golf	23	Leader board and putting stroke
Golf	24	Money factor due to myself, striving for the money side of things
Golf	25	The fact that my partner had done his or her bit for the team
Golf	26	The wanting to win
Golf	27	The fact that I would be letting my partner down. I did not believe that the scores would be displayed etc.
Golf	28	The money because my partner needed me to well to win the money. Because my partner had already done well themselves
Golf	29	Letting another person down, want to succeed
Golf	30	Knowing I hit it out of the top of the face. Made me focus on technique more normally don't focus on technique

Golf	31	Being part of a team
Golf	32	Me, striving for perfection 20/20
Golf	33	Money influence, leader board, getting videoed/recorded, swing getting analysed
Golf	34	The fact that I was part of a team, if I holed lots of putts had a chance of winning money. Leader board was a high standard.
Golf	35	The risks at stake, trying to not let my partner down
Golf	36	having to work in a team
Golf	37	If it was for chipping or long putting it would have
Golf	38	Didn't experience any
Golf	39	Element of competition
Golf	40	50 quid and trying to do my best
Golf	41	Letting the other person down
Golf	42	Own definition
Golf	43	my own performance
Golf	44	The competition, I put more pressure on myself to perform, I didn't want to let my partner down
Archery	45	Knowing that a national coach would be sent the video. Knowing that a reward was there for winning but having to perform well like my team mate has done
Archery	46	Thought about team mate and needed to try and improve
Archery	47	Wanting to do well for my teammate and the prize
Archery	48	Competition element, try to do well
Archery	49	Thinking about technique on last 3 shots= poor shooting. Stopped trying to shoot abnormal style and relaxed for the other 6, much less pressure.
Archery	50	Competing against others, increase of focus and determination

Appendix V- Chapter 5 Additional Results Data

Additional Data on Level of Competition

Demographic information for the participants in the current study for age, years of experience, years played at the highest level, current handicap and best handicap.

	Sport	
Variable	Golf	Archery
Age	36.23 (18.33)	56 (5.18)
Years of experience	16.25 (16.19)	18.33 (14.88)
Years played at highest level	8.22 (12.93)	9.5 (12.44)
Current Handicap	9.70 (7.34)	n/a
Best Handicap	7.83 (6.27)	n/a

Demographic information for number of athletes at highest experience level

	Highest Level				
Sport	Club/University	County	National	International	Total
Golf	28	9	2	5	44
Archery	0	4	2	0	6
Total	28	13	4	5	50

Additional Data on psychological and physiological state measures

*Total Mean and Standard Deviation for the psychological and physiological state measures (*p = <0.05).*

	Pressure Condition	
	Low-Pressure	High-Pressure
Variable	Mean SD	
Cognitive Anxiety Intensity*	1.72 (.55)	1.97 (.65)
Cognitive Anxiety Interpretation	4 (1.11)	3.83 (1.29)
Somatic Anxiety Intensity*	1.66 (.46)	1.8 (.57)
Somatic Anxiety Interpretation*	4.17 (1.05)	3.98 (1.16)
Confidence Intensity	2.9 (.51)	2.87 (.59)
Confidence Interpretation*	5.3 (1.05)	5.12 (1.13)
Heart Rate (bpm)*	83.9 (13.39)	86.74 (13.95)
Mental Effort*	101.9 (31.35)	119.2 (28.16)

Additional Data on choking group

Choking

Mann-Whitney test indicated that there was no significant difference in age, *U* = 196.5, *p* = .23, current handicap, *U* = 127, *p* = .06, years of experience, *U* = 221, *p* = .51, or years at the highest level, *U* = 227.5, *p* = .59, between the two groups. A Mann Whitney test indicated that the choking-affected group had a significantly lower best handicap than those unaffected, *U* = 111.5, *p* = .02. For choking the prevalence rate was 72% for both sports, with specific rates of 83.3% and 70.5% for archery and golf respectively.

*Mean and Standard Deviation for the choking groups demographics (*p = <0.05).*

	Choking	
Variable	Yes (*n* = 36)	No (*n* = 14)
Age	36.92 (18.05)	42.93 (19.38)
Years of experience	18.74 (17.55)	10.75 (8.69)
Years played at highest level	9.21(14.03)	6.21 (8.71)
Current Handicap	8.56 (6.44)	12.42 (5.73)
Best Handicap*	6.44 (6.21)	11.15 (5.24)

Demographic information for number of athletes at highest experience level for choking

	Highest Level				
	School/Club	County	National	International	Total
Choking			*n*		
Yes	17	10	4	5	36
No	11	3	0	0	14
Total	28	13	4	5	50

Additional Data on yips group

Yips

A Mann Whitney test indicated that there was no significant difference between current handicap, *U* = 159, *p* = .54, best handicap, *U* = 176, *p* = .88, years of experience, *U* = 172.5, *p* = .13, or years of experience, at their highest level, *U* = 237.5, *p* = .946. A Mann Whitney test also revealed that those yips affected athletes were significantly older than those unaffected, *U* = 147, *p* = .04. For the yips the prevalence rate was 26% for both sports, with specific rates of 33.3% and 25% for archery and golf respectively.

Mean and Standard Deviation for the yips groups demographics

	Yips	
Variable	Yes (*n* = 13)	No (*n* = 37)
Age (years)*	47.54 (19.54)	35.46 (17.21)
Years of experience	24.92 (19.82)	13.54 (13.38)
Years played at highest level	12.5 (16.43)	6.92 (11.09)
Current Handicap	11.18 (8.06)	9.21 (7.15)
Best Handicap	7.45 (6.06)	7.96 (6.42)

Demographic information for number of athletes at highest experience level for yips

	Highest Level				
	School/Club	County	National	International	Total
Yips			*n*		
Yes	7	3	0	3	13
No	21	10	4	2	37
Total	28	13	4	5	50

Additional Data on kinematic data

The Mean and SD for both choking groups for the kinematic measures in golf and archery. A= archery, G= Golf (p<0.05).*

	Choking	
	Yes (*n*= 26)	No (G *n* = 13)
Variable	Means (SD)	
Club Head Velocity 5ft (G)	-.028 (.127)	-.036 (.051)
Club Head Velocity 7ft (G)*	.044 (.14)	-.135 (.556)
Stroke Length 5ft (G)	-.011 (.023)	-.012 (.007)
Stroke Length 7ft (G)	-0.001 (.062)	-.047 (.17)
Attack Angle at Ball Contact 5ft (G)	-.601 (1.089)	-.056 (.633)
Attack Angle at Ball Contact 7ft (G)	-.212 (1.15)	-.429 (1.905)
5ft performance (G)	9.31 (1.01)	9.46 (1.2)
7ft performance (G)	8.11 (1.75)	7.46 (2.14)

The Mean and SD for both yips groups for the kinematic measures in golf and archery. A= archery, G= Golf (p<0.05).*

	Yips	
	Yes (G *n* = 9)	No (G *n* = 30)
Variable	Means (SD)	
Club Head Velocity 5ft (G)	-.029 (.077)	-.031 (.115)
Club Head Velocity 7ft (G)*	-.202 (.665)	.041 (.134)
Stroke Length 5ft (G)	-.008 (.009)	-.012 (.021)
Stroke Length 7ft (G)	-.003 (.013)	-.02 (.125)
Attack Angle at Ball Contact 5ft (G)	-.032 (.645)	-.544 (1.05)
Attack Angle at Ball Contact 7ft (G)	-.127 (.879)	-.332 (1.559)
5ft performance (G)	9.44 (1.33)	9.33 (.99)
7ft performance (G)	8.11 (1.61)	7.83 (1.98)

Additional Data on correlations

Total Mean and Standard Deviation for the state and trait measures used in the correlation analyses

Variable	Mean	SD	*n*
5FT Putting Score (HP)	9.3	1.21	44
7ft Putting Score (HP)	7.89	1.88	44
Archery Total Score (HP)	78.17	6.74	6
SL 5ft (VAR)	-0.01	0.019	39
SL 7ft (VAR)	-0.06	0.11	39
AABC 5ft (VAR)	-0.43	0.99	39
AABC 7ft (VAR)	-0.28	1.42	39
CHV 5ft (VAR)	-0.03	0.11	39
CHV 7ft (VAR)	0.02	0.34	39
LOD (VAR)	-0.002	0.01	6
WA (VAR)	-0.94	1.88	6
SAN (VAR)	-0.07	3.36	6
SAB (VAR)	0.1	0.61	6
DT (VAR)	-0.28	0.23	6
HR (VAR)	86.74	13.95	50
RSME (VAR)	119.2	28.16	50
Cognitive Anxiety Intensity (HP)	1.97	0.65	50
Cognitive Anxiety Interpretation (HP)	3.83	1.29	50
Somatic Anxiety Intensity (HP)	1.8	0.58	50
Somatic Anxiety Interpretation (HP)	3.98	1.16	50
Confidence Intensity (HP)	2.87	0.59	50

Confidence Interpretation (HP)	5.12	1.13	50
Perfectionistic Strivings	3.46	0.75	50
Perfectionistic Concerns	2.44	0.71	50
Perfectionistic Self-Presentation	3.89	1.14	50
Non-Display of Imperfection	3.68	1.17	50
Non-Disclosure of Imperfection	3.77	0.83	50
Neuroticism	2.79	0.93	50
Agreeableness	3.63	0.83	50
Conscientiousness	3.75	0.96	50
Extraversion	3.47	0.98	50
Openness	3.48	0.65	50

SL= Stroke length; AABC= Attack angle at ball contact; CHV= Club head velocity; LOD= Length of draw; WA= Wrist angle; SAN= Shoulder angle; SAB= Shoulder abductor; DT= Draw time; HP= High-pressure

Archery Kinematic Findings

2 x 2 x 2 MANOVA

For the archery kinematics, the analysis revealed that there was no significant main effect for choking, F (2, 3) = 43.78, p = .111, Wilk's λ = 0.008, partial η^2 = .99. There was a near significant main effect for yips, F (2, 3) = 130.73, p = .07, Wilk's λ = 0.003, partial η^2 = .99. The table below shows the means and standard deviations for both the yips and choking groups for the kinematic and performance measures for golf and archery.

	Choking	
	Yes (A *n*=5)	No (A *n*= 1)
Variable	Means (SD)	
Length of Draw (A)	.001 (.01)	-0.002
Draw Time (A)	-0.248 (.241)	-0.456
Shoulder Abduction (A)	0.0884	0.156
Shoulder Angle (A)	0.300 (3.61)	-1.98
Wrist Angle (A)	-1.15 (2.02)	-0.13
Total Score (A)*	80.8 (2.17)	65

Archery Kinematics

Univariate analyses revealed that yips affected archers had longer LOD in high pressure than those unaffected, F (2, 3) = 15.73, p = .029, partial η^2 = .84. Univariate analyses also revealed that those archers who had experienced choking before had a significantly higher performance than those who had not, F (2, 3) = 112.5, p = .023, partial η^2 = .04.

	Yips	
	Yes (A n= 2)	No (A n =4)
Variable	Means (SD)	
Length of Draw (A)*	.01 (.017)	-.005 (.006)
Draw Time (A)	-.399 (.081)	-.224 (.27)
Shoulder Abduction (A)	.078 (.11)	.1105 (.782)
Shoulder Angle (A)	1.591 (5.04)	-.912 (2.75)
Wrist Angle (A)	-.356 (.687)	1.231 (2.32)
Total Score (A)	72.5 (10.61)	81 (2.45)

Additional Data on yips sub-groups

Shows the breakdown of athletes in all three yips-subgroups based on symptoms

	Yips type			
Sport	Type-I	Type-II	Type-III	Total
Archery	0	0	2	2
Golf	0	2	9	11
Total	0	2	11	13

Shows the breakdown of athletes in all three choking subgroups based on symptoms

	Symptom type			
Sport	Physical	Psychological	Both	Total
Archery	0	0	5	5
Golf	3	5	23	31
Total	3	5	28	36

Additional Data on Symptoms

Yips

The current findings highlight that no athletes were type-I affected, two athletes were type-II and the majority were type-III (*n* = 11). Interestingly all archers were type-III yips affected. Due to the small sample sizes no data was analysed (i.e., chi square) but the values for each symptom are displayed in table 5.18. The most commonly experienced physical symptoms for the yips affected athletes (all three types) was feeling jittery (*n* =10) and jerks (*n* =8). The most commonly experienced psychological symptom was nerves and anxiety (*n* =12), increased negativity (*n* = 10) and self-conscious (*n* = 10).

Choking

Identical to the approach adopted in chapter four of this thesis the choking group were differentiated into three groups based on the types of symptoms they experienced during their choking experience. These groups included: physical symptoms only, psychological symptoms only and those who experienced both physical and psychological symptoms. Due to the small sample sizes no data was analysed (i.e., chi square) but the values for each symptom will be provided in Appendix V. The most commonly experienced physical symptoms experienced during a choking experience was loss of precision (*n* = 18), jittery, butterflies and loss of control of limbs (*n* = 17). The most commonly experienced psychological symptom was nervous and anxiety (*n* = 19), self-consciousness (*n* =18).

Frequency for symptoms across yips groups and archery and golf

		Yips Type						Yips Type			
		Type-I	Type-II	Type-III	Total			Type-I	Type-II	Type-III	Total
Symptoms	Sport		*n*			**Symptoms**	Sport		*n*		
Jerks	*Archery*	0	0	2	2	**Self-conscious**	*Archery*	0	0	1	1
	Golf	0	0	6	6		*Golf*	0	2	7	9
	Total	0	0	8	8		Total	0	2	8	10
Tremors	*Archery*	0	0	2	2	**Can’t control thought process**	*Archery*	0	0	0	0
	Golf	0	0	4	4		*Golf*	0	1	4	5
	Total	0	0	6	6		Total	0	1	4	5
Spasms	*Archery*	0	0	1	1	**Nervous and anxiety**	*Archery*	0	0	2	2
	Golf	0	0	1	1		*Golf*	0	1	9	10
	Total	0	0	2	2		Total	0	1	11	12
Freezing	*Archery*	0	0	1	1	**Can't focus**	*Archery*	0	0	1	1
	Golf	0	0	4	4		*Golf*	0	1	7	8
	Total	0	0	5	5		Total	0	1	8	9
Uncontrollable movement of limbs	*Archery*	0	0	0	0	**Unable to make decision**	*Archery*	0	0	1	1
	Golf	0	0	4	4		*Golf*	0	1	6	7
	Total	0	0	4	4		Total	0	1	7	8
Loss of control of limbs	*Archery*		0	1	1	**Threatening**	*Archery*	0	0	0	0
	Golf	0	0	4	4		*Golf*	0	2	2	4
	Total	0	0	5	5		Total	0	2	2	4
Loss of precision	*Archery*	0	0	0	0	**Increased negativity**	*Archery*	0	0	1	1
	Golf	0	0	7	7		*Golf*	0	1	8	9
	Total	0	0	7	7		Total	0	1	9	10
Sweating	*Archery*	0	0	0	0	**Self-critical**	*Archery*	0	0	1	1
	Golf	0	0	2	2		*Golf*	0	1	7	8
	Total	0	0	2	2		Total	0	1	8	9

Butterflies	*Archery*	0	0	1	1	**Controlling emotions**	*Archery*	0	0	0	0
	Golf	0	0	6	6		*Golf*	0	0	3	3
	Total	0	0	7	7		Total	0	0	3	3
Jittery	*Archery*		0	2	2						
	Golf	0	0	8	8						
	Total	0	0	10	10						

Frequency for symptoms across choking groups and archery and golf

		Symptom Type						Symptom Type			
		Physical	Psychological	Both	Total			Physical	Psychological	Both	Total
Symptoms	Sport		*N*			**Symptoms**	Sport		*n*		
Jerks	*Archery*	0	0	3	3	**Self-conscious**	*Archery*	0	0	4	4
	Golf	2	0	7	9		*Golf*	0	3	11	14
	Total	2	0	10	12		Total	0	3	15	18
Tremors	*Archery*	0	0	2	2	**Can't control thought process**	*Archery*	0	0	0	0
	Golf	1	0	3	4		*Golf*	0	2	12	14
	Total	1	0	5	6		Total	0	2	12	14
Spasms	*Archery*	0	0	0	0	**Nervous and anxiety**	*Archery*	0	0	3	3
	Golf	0	0	4	4		*Golf*	0	2	14	16
	Total	0	0	4	4		Total	0	2	17	19
Freezing	*Archery*	0	0	0	0	**Can't focus**	*Archery*	0	0	2	2
	Golf	0	0	7	7		*Golf*	0	1	11	12
	Total	0	0	7	7		Total	0	1	13	14
Uncontrollable movement of limbs	*Archery*	0	0	1	1	**Unable to make decision**	*Archery*	0	0	0	0
	Golf	1	0	5	6		*Golf*	0	1	8	9
	Total	1	0	6	7		Total	0	1	8	9
Loss of control of limbs	*Archery*	0	0	3	3	**Threatening**	*Archery*	0	0	0	0
	Golf	2	0	12	14		*Golf*	0	0	7	7
	Total	2	0	15	17		Total	0	0	7	7
Loss of precision	*Archery*	0	0	3	3	**Increased negativity**	*Archery*	0	0	1	1
	Golf	1	0	14	15		*Golf*	0	2	14	16
	Total	1	0	17	18		Total	0	2	15	17
Sweating	*Archery*	0	0	1	1	**Self-critical**	*Archery*	0	0	2	2
	Golf	1	0	12	13		*Golf*	0	2	13	15
	Total	1	0	13	14		Total	0	0	15	17
Butterflies	*Archery*	0	0	2	2		*Archery*	0	0	1	1

	Golf	1	0	14	15	**Controlling emotions**	*Golf*	0	0	12	12
	Total	1	0	16	17		Total	0	0	13	13
Jittery	*Archery*	0	0	4	4						
	Golf	2	0	11	13						
	Total	2	0	15	17						